Annual Report of the Bombay Smoke-Nuisances Commission for the years 1931-32 ~~and~~ to 1934-35 and 1938-39

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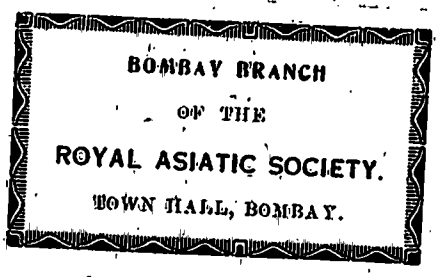

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Nineteenth Annual Report

of the

Bombay Smoke-nuisances Commission

For the Year 1931-32

1934-35 & 1938-39

[Price—Anna 1 *or* 1*d*.]

BOMBAY
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1932

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NINETEENTH ANNUAL REPORT OF THE BOMBAY SMOKE-NUISANCES COMMISSION FOR THE YEAR 1931-32.

1. This report covers the period from 1st April 1931 to 31st March 1932. The Commission consisted of the following members :—

President.

(1) Mr. J. W. Smyth, I.C.S., Collector of Bombay (from 1st April 1931 to 24th November 1931). Mr. E. W. Perry, C.I.E., I.C.S., Acting Collector of Bombay (from 25th November 1931 to 10th December 1931). Mr. M. S. Jayakar, M.A., Collector of Bombay (from 11th December 1931 to 4th January 1932). Mr. W. Dillon, I.C.S., Acting Collector of Bombay (from 5th January 1932 to 15th January 1932). Mr. M. S. Jayakar, M.A., Collector of Bombay (from 16th January 1932 to 8th February 1932). Mr. W. Dillon, I.C.S., Acting Collector of Bombay (from 9th February 1932 to 26th February 1932). Mr. D. MacLachlan, I.C.S., Collector of Bombay (from 27th February 1932 to 31st March 1932).	*Ex-officio.*

Members.

(2) Mr. P. B. Advani, M.Sc.	Nominated by Government.
(3) Mr. R. McMurray	
(4) Mr. E. G. Cameron	
(5) Vacant (from 1st April 1931 to 4th May 1931). Mr. J. D. Pember (from 5th May 1931 to 31st March 1932).	Elected by the Millowners' Association, Bombay.
(6) Mr. W. A. Sutherland ..	

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(7) Mr. R. L. Ferard (from 1st April 1931 to 25th November 1931). Vacant (from 26th November 1931 to 31st December 1931). Mr. H. F. Milne (from 1st January 1932 to 31st March 1932).	Elected by the Chamber of Commerce, Bombay.

SUB-COMMITTEE FOR KARACHI.

President.

(1) Mr. J. Monteath, I.C.S., Collector of Karachi (from 1st April 1931 to 23rd December 1931). Mr. J. R. Hood, I.C.S., Collector of Karachi (from 24th December 1931 to 31st March 1932).	*Ex-officio.*

Members.

(2) Mr. W. C. Echlin (from 1st April 1931 to 15th May 1931). Vacant (from 16th May 1931 to 26th July 1931). Mr. H. A. Brown (from 27th July 1931 to 31st December 1931). Mr. A. Eaglesham (from 1st January 1932 to 31st March 1932).	Nominated by Government.
(3) Khan Bahadur A. H. Mama (from 1st April 1931 to 31st December 1931). Mr. J. H. Patel (from 1st January 1932 to 31st March 1932).	Elected by the Karachi Municipality.
(4) Mr. R. J. Raine (from 1st April 1931 to 31st December 1931). Mr. G. M. Carter (from 1st January 1932 to 31st March 1932).	Elected by the Factory Owners, Karachi.

SUB-COMMITTEE FOR AHMEDABAD.

President.

(1) Mr. E. G. Taylor, I.C.S., Collector of Ahmedabad (from 1st April 1931 to 4th April 1931). Mr. E. W. Trotman, I.C.S., Collector of Ahmedabad (from 5th April 1931 to 19th March 1932). Mr. S. M. S. Maulvi, Acting Collector of Ahmedabad (from 20th March 1932 to 26th March 1932). Mr. J. B. Irwin, I.C.S., Collector of Ahmedabad (from 27th March 1932 to 31st March 1932).	*Ex-officio.*

Members.

(2) Mr. M. T. Adalja, Executive Engineer, Ahmedabad Division .. *Ex-officio.*

(3) Colonel Sir B. H. Nanavaty, Kt., C.I.E., (from 1st April 1931 to 31st December 1931).
Mr. Gulzarilal Nanda, M.A., (from 1st January 1932 to 31st March 1932). } Elected by the Ahmedabad Municipality.

(4) Sheth Sakarlal Balabhai .. .. Elected by the Millowners' Association, Ahmedabad.

2. During the year three meetings of the Commission were held at Bombay and one of the Sub-Committee was held at Ahmedabad. No meeting was held of the Sub-Committee at Karachi.

3. In Bombay the services of one Inspector were wholly devoted to smoke nuisances inspection throughout the year.

At Karachi the smoke nuisances inspection was carried out by the Inspector in addition to his boiler inspection work and his work on tour.

At Ahmedabad the smoke nuisances inspection was carried out by the Inspector stationed there in addition to his local and occasional district boiler inspection work.

4. The following table summarises and compares the work of the year and that of the preceding year in the three areas :—

		Observations of chimneys	Visits to factories	Tests of appliances
Bombay ..	1931-32 ..	5,993	1,314	35
Do. ..	1930-31 ..	5,989	1,690	47
Karachi ..	1931-32 ..	237	330	13
Do. ..	1930-31 ..	203	326	6
Ahmedabad ..	1931-32 ..	805	763	*Nil.*
Do. ..	1930-31 ..	1,049	889	*Nil.*
Total ..	1931-32 ..	7,035	2,407	48
	1930-31 ..	7,241	2,905	53

5. In comparison with the figures for the last year the total number of observations in Bombay shows practically no difference while that of visits to factories and of tests of appliances decreased in the year. Since the Act has been amended a considerable time is spent in explaining to the owners of smaller factories the extent of the amended Act and Rules and in giving advice for the construction of flues and chimneys according to requirements, and this accounts for the decrease recorded in the number of visits and tests.

In spite of the continued depression in trade and its consequences on the industries generally furnaces are being erected all over Bombay in connection with the smaller industries such as, metal casting, refining of precious metals, manufacture of soap, etc. These are being dealt with under the Act and in this connection the Commission records with satisfaction the valuable assistance received from the Municipal authorities. Under the arrangement made with the License Department the owner of a factory who applies for a license under the City Municipal Act is asked by the Department to comply with the provisions of the Smoke Nuisances Act before such license is granted and the Commission is at the same time informed of the application received. On receipt of such report the factory is visited and instructions are given regarding the requirements of the Act and when these are carried out recommendation is made to the Superintendent of Licenses to issue a license. Previously, furnaces were erected without any reference to the Commission or compliance with the Rules under the Act in consequence of which the owners in some cases were put to additional expenses in carrying out the requisite changes. The above method is also being followed in regard to the renewal of licenses and thus all the smaller factories with industrial furnaces will be gradually brought on the register of the Commission.

The year under report records a slight increase in the average emission of smoke. This is due to nearly all the textile mills and factories using Indian coal. Previously African coal was used in a good many factories. English coal is used in one or two cases mixed with the Indian coal on account of the heavy load on boilers and the amount of steam required for the plant used. In the smaller factories such as oil mills which only require from 25 to 30 lbs. of steam for the expellers, the owners were advised to use coke and coal mixed to obviate smoke nuisance. The conversion from coal to oil fuel of the various mills and factories reported in previous years may not be permanent on account of the very low prices of coal and the comparatively high prices of oil.

The B. B. & C. I. Railway have gradually removed their major repair shop from Parel to Dohad during the year, only a few fires and furnaces being left for urgent work. The G. I. P. Railway have converted the furnaces at their workshops at Parel from coal to oil fuel. Thus with the above changes and the electrification of the train services on both Railways the smoke nuisance should be considerably minimised in the locality around the workshops which are situated in close proximity to the residential quarters.

The shipping in the Alexandra, Victoria and Prince's Docks has been much the same as in the previous year. Many ships, however, have entered the harbour with a small cargo and left almost immediately instead of the usual stay of from 7 to 10 days.

Electricity is being largely used in smaller industries in lieu of steam and also for domestic purposes. Gas is also largely used for domestic purposes and although the smoke from domestic chimneys does not come under the scope of the Act, it may be observed, that the use of electricity

and gas has made marked improvement in the atmosphere of residential quarters.

6. In Karachi the total number of observations, of visits to factories and of tests of appliances compares favourably with the figures of the previous year as will be seen from the increase recorded under each of the three heads. Owing to the diminution of the Lloyd Barrage Works and the grouping of inspections of mofussil boilers there is now less pressure of boiler inspection work in the districts and so it has been possible to devote more time for smoke nuisances duties than in previous years.

7. The fall in the number of observations and of visits to factories recorded at Ahmedabad was due to the less number of hours devoted to smoke nuisances duties as compared with those in the preceding year owing to the heavy pressure of boiler inspection work. It may be noted, however, that all the observations are of full one hour duration.

The year under report shows a slight increase in the average emission of smoke per hour per chimney. Many of the textile mills in the city have increased the load on their existing plants by introducing extra spinning and weaving machinery without at the same time making adequate provision for extra boiler power. The attention of the mill authorities concerned was drawn to this and it is satisfactory to note that in about 13 cases additional boilers have been fitted or the existing arrangement of flues altered.

At the request of the local Sanitary Association the Chief Inspector attended one of their meetings in the year under report when the problem of the abatement of smoke was generally discussed. The success already obtained by the Commission was pointed out and it was agreed that this was highly creditable in view of the reduction of black smoke per day approximately from 8,000 minutes in 1925 to 2,000 minutes in 1930. The Act does not apply at present to fires used for domestic purposes such as cooking, etc., and it was therefore recommended to the Association that their activities should be directed towards the abatement of smoke from these fires since they are responsible for smoky evenings in certain months of the year. The Association was also advised to encourage smoke nuisance complaints from the public and get them forwarded to the Health Officer or direct to the Local Sub-Committee of the Commission.

As stated in the previous year's report the practice of holding conferences with owners whenever black offensive smoke was observed, was much more resorted to rather than issuing written notices. Attention was also paid to the nuisance caused by Railway locomotives by personally interviewing the Railway authorities.

There are a number of furnaces used in smaller factories which are not yet registered. Being mostly situated in the congested areas of the city they are a nuisance to the residents close by, as sufficient means are not provided to emit the smoke inside the factories into the atmosphere. Arrangements are now being made to bring them on the register and the Commission hopes that it will receive the full co-operation of the local Municipality in this behalf as in Bombay.

There were 15 new boilers imported and registered in Ahmedabad City during the year of which six were spare, one was for a new concern and the remaining eight were installed either to replace the old boilers or to meet the extra power required. Two new cotton mills which were stated to be nearing completion in the last year's report have started work during the year. One new mill is nearing completion and will start work during the course of a few weeks and five more mills are under erection. About 15 mills worked day and night during the year.

8. The emission of smoke is recorded according to the following table :—

Scale	No. 1	..	..	..	No smoke.
,,	No. 2	..	..	..	Light grey.
,,	No. 3	..	..	..	Grey.
,,	No. 4	..	..	..	Very dark grey.
,,	No. 5	..	..	..	Black.
,,	No. 6	..	..	..	Dense black.

For the purpose of smoke nuisances inspection only scales Nos. 4, 5 and 6 are important. In Bombay and other areas to which the Act has been applied the emission of dense black smoke (scale No. 6) is prohibited. Scales Nos. 5 and 4 are related to scale No. 6 as follows :—One minute of scale No. 5 (black smoke) is taken as equal to ·55 minute of scale No. 6 (dense black) and one minute of scale No. 4 (very dark grey) is taken as equal to ·37 minute of scale No. 6.

On this basis, the average of smoke of the three highest densities was equal to ·623 minute per hour of dense black smoke for each of the 2,571 observations of the chimneys for one hour in Bombay during the year, as compared with ·477 minute per hour for the preceding year.

For each of the 236 observations of the chimneys for one hour at Karachi during the year the average emission was equal to 1·411 minutes per hour of dense black smoke as against 1·207 minutes per hour in the previous year.

For each of the 805 observations of the chimneys for one hour at Ahmedabad the average emission was equal to 1·59 minutes per hour as compared with 1·4 minutes per hour in the previous year.

9. There were at the close of the year 829 stationary chimneys in Bombay Island and Kurla, 47 in Karachi and 122 in Ahmedabad on the register of the Commission. The above figures represent the number of existing chimneys only those removed having been struck off the register. During the year 76 new chimneys were added to the register in Bombay, 2 at Karachi and 4 at Ahmedabad. Besides the registered stationary chimneys there is a large number of portable chimneys controlled by the Commission, such as connected to Railway locomotives, road rollers, portable engines, steam ships and launches, etc.

10. Observations are taken daily of the smoke emitted from the various chimneys to see that it does not exceed the limits prescribed under the rules. For the purpose of comparison and record a series of observations of one hour duration are taken from which is compiled an average emission for each month and subsequently an average for the year. This average is taken as representative of the total smoke emissions for the area throughout the year. The following table shows the yearly average emission of smoke for Bombay, Karachi and Ahmedabad since the statistics have been maintained :—

BOMBAY.

Year.	Scales Nos. 6, 5 and 4 reduced to scale No. 6, i.e., dense black— Minutes per hour.
1913 February	11·6
1913 March	6·5
1914 „	1·86
1915 „	1·474
1916 „	1·432
1917 „	1·235
1918 „	1·203
1919 „	1·144
1920 „	1·254
1921 „	1·406
1922 „	1·82
1923 „	1·55
1924 „	1·949
1925 „	1·416
1926 „	1·146
1927 „	1·26
1928 „	1·104
1929 „	·61
1930 „	·51
1931 „	·477
1932 „	·623

KARACHI.

1922 (October 1921 to March 1922)	4·538
1923 March	2·221
1924 „	1·804
1925 „	2·37
1926 „	4·57
1927 „	2·765
1928 „	2·432
1929 „	1·705
1930 „	1·493
1931 „	1·207
1932 „	1·411

AHMEDABAD.

Year.	Scales Nos. 6, 5 and 4 reduced to scale No. 6, i.e., dense black— Minutes per hour.
1924 (November 1923 to March 1924)	6·56
1925 March	3·95
1926 ,, ...	3·5
1927 ,, ...	2·68
1928 ,, ...	2·63
1929 ,, ...	2·00
1930 ,, ...	2·23
1931 ,, ...	1·4
1932 ,, ...	1·59

11. The following notices and warnings were issued during the year :—

—		Notices.	Intimations.	Statutory warnings.
Bombay ..	Factories	381	8	5
	Locomotives	13	*Nil.*	*Nil.*
	Steam lorries	*Nil.*	*Nil.*	*Nil.*
	Road rollers, cranes and single boilers	*Nil.*	*Nil.*	*Nil.*
	Steam ships	182	8	*Nil.*
	Tugs and launches	3	*Nil.*	*Nil.*
Karachi ..	Factories	5	*Nil.*	*Nil.*
	Locomotives	*Nil.*	*Nil.*	*Nil.*
	Steam ships	8	2	*Nil.*
Ahmedabad ..	Factories	55	*Nil.*	5
	Locomotives	6	*Nil.*	*Nil.*
	Road rollers, cranes and single boilers	*Nil.*	*Nil.*	*Nil.*

The thanks of the Commission are due to the mill and factory owners, heads of engineering departments, public bodies, shipping agencies, etc., for their cordial co-operation with the Inspectors in the abatement of smoke nuisances. By this means drivers and firemen are dealt with departmentally by their superiors when found to be careless in causing unnecessary smoke.

12. Fourteen complaints were received from the public in Bombay during the year and steps were taken to minimise the nuisance as far as possible. All these complaints it may be observed were against the smaller factories.

There was no complaint received from the public either at Karachi or Ahmedabad.

13. In Bombay the owner of a bakery was prosecuted for failing to raise the chimney to the height required by the Commission. The owner

was convicted and fined. The prosecution against the owner of a smith-shop and coach factory reported last year was also successful. Several offences under section 9-A of the Act were detected but these were confined to small industrial furnaces only. The defaulters were quite willing to carry out the requirements of the Commission and a severe warning was therefore considered sufficient.

No prosecution was instituted for any breach of the Act either at Karachi or Ahmedabad.

14. The new rules regarding the construction of flues and chimneys are working very satisfactorily. During the year the Commission examined four plans at Bombay and sixteen at Ahmedabad. Of the former two related to new concerns and the remaining were for additions and alterations: of the latter three were for new concerns and the remaining thirteen for additions and alterations. All of these were approved except in two or three cases where approval was granted subject to certain changes. In addition to the above plans several sketches were submitted to the Commission at Bombay where small industrial furnaces are being dealt with under the amended Act. In many cases rough sketches were prepared in the office of the Chief Inspector and supplied to owners to assist them in the proper building up of flues and chimneys.

Although the rules came in for certain criticism in the beginning, the owners have, it seems, now generally realised that they are beneficial from the point of efficiency of boilers and the economic consumption of fuel, more especially in the case of new concerns which are likely to extend. Though in some cases the initial outlay is slightly higher it is compensated by the efficient working of the plant.

15. During the year Rule 1 under the Act regarding the meetings of the Commission was amended as a measure of economy in expenditure. Accordingly, meetings will be held half-yearly at Bombay and the sub-committees at Karachi and Ahmedabad will meet once a year in future.

16. Mr. J. Pratt was in charge of the office of the Chief Inspector of Steam Boilers and Smoke Nuisances throughout the year.

Mr. S. H. Thaker was in charge of the smoke nuisances inspection work in Bombay till 16th October 1931 when he was relieved by Mr. A. W. Marks who was in charge of this work during the remaining period of the year.

Mr. S. Gazdar was in charge of the smoke nuisances inspection work at Karachi throughout the year.

Mr. J. Cubbon was in charge of the smoke nuisances inspection work at Ahmedabad throughout the year.

The Commission was satisfied with the work done by the staff.

A. MASTER,

Bombay, 2nd June 1932. Collector of Bombay and President, Bombay Smoke-Nuisances Commission.

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BOMBAY : PRINTED AT THE GOVERNMENT CENTRAL PRESS.

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Twenty-second Annual Report

of the

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For the Year 1934-35

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TWENTY-SECOND ANNUAL REPORT OF THE BOMBAY SMOKE-NUISANCES COMMISSION FOR THE YEAR 1934-35.

1. This report covers the period from 1st April 1934 to 31st March 1935. The Commission consisted of the following members :—

President.

(1) Mr. J. F. Cennings, C.B.E., Bar-at-Law, Commissioner of Labour.	*Ex-officio.*

Members.

(2) Mr. P. B. Advani, M.Sc.	Nominated by Government.
(3) Mr. R. B. McGregor	
(4) Mr. E. G. Cameron	
(5) Mr. W. F. Webb, M.I., Mare.E. ..	Elected by the Bombay Mill-owners' Association.
(6) Mr. W. A. Sutherland from 1st April 1934 to 29th November 1934. Vacant from 30th November 1934 to 22nd January 1935. Mr. Mark Binnie from 23rd January 1935 to 31st March 1935.	
(7) Mr. H. F. Milne	Elected by the Chamber of Commerce, Bombay.

SUB-COMMITTEE FOR KARACHI.

Chairman.

(1) Mr. C. F. S. Collins, C.I.E., O.B.E., I.C.S., Collector of Karachi, from 1st April 1934 to 5th May 1934. Mr. H. M. Willis, I.C.S., Collector of Karachi, from 6th May 1934 to 5th February 1935. Mr. E. G. Taylor, I.C.S., Collector of Karachi, from 6th February 1935 to 31st March 1935.	*Ex-officio.*

Members.

(2) Vacant from 1st April 1931 to 25th April 1934. Mr. H. W. Huggins from 26th April 1934 to 31st March 1935.	Nominated by Government.

(3) Mr. J. H. Patel	Elected by the Karachi Municipality.
(4) Mr. G. N. Gokhale, B.Sc., L.C.E., M.I.E. (Ind.), I.S.E. (Retired).	Elected by the Factory-owners, Karachi.

SUB-COMMITTEE FOR AHMEDABAD.

Chairman.

(1) Mr. A. H. Dracup, B.A., Collector of Ahmedabad.	*Ex-officio.*

Members.

(2) Mr. Ambernath Bhattacharya, Executive Engineer, Ahmedabad Division.	*Ex-officio.*
(3) Colonel Sir B. H. Nanavaty, Kt., C.I.E. ..	Elected by the Ahmedabad Municipality.
(4) Sheth Sakarlal Balabhai	Elected by the Millowners' Association, Ahmedabad.

2. During the year three meetings (two ordinary and one special) of the Commission were held at Bombay, one at Ahmedabad and one at Karachi.

3. In Bombay the time of one Inspector was mainly devoted to smoke nuisances inspection throughout the year.

In Karachi and Ahmedabad the work was done by Inspectors in addition to their boiler inspection work.

4. The following table summarises and compares the work of the year and that of the preceding year in the three areas :—

—		Observations of chimneys.	Visits to factories.	Tests of appliances.
Bombay	1933–34 ..	3,514	776	46
	1934–35 ..	3,658	822	58
Karachi	1933–34 ..	288	322	*Nil*
	1934–35 ..	244	267	*Nil*
Ahmedabad	1933–34 ..	986	732	5
	1934–35 ..	1,671	746	10
Total	1933–34 ..	4,788	1,830	51
	1934–35 ..	5,573	1,835	68

5. A comparison of the figures for the two years shows an increase in the number of observations, visits to factories and the tests of appliances. The practice of not taking short time observations along with the hourly observations has been continued.

While paying visits to the factories the opportunity is always taken to bring to the notice of the owners the necessity of submitting plans as required by section 9A (1) of the Act for the erection and addition or alteration of the furnaces and chimneys. This has resulted in the submission of more plans for the examination of the Commission.

Close co-operation between the Municipal authorities and the Smoke Nuisances Department has resulted in avoiding inconvenience to the factory owners. The License Department of the Municipality issues licenses as soon as their requirements are carried out without waiting for the requirements of the Smoke Nuisances Commission to be completed. This enables a factory to operate without delay although the liability to carry out work ordered by this Department still remains.

The decrease in the annual average emission of smoke has been steadily maintained. The desirability of using liquid fuel or coal of good quality for abating smoke nuisance in large plants is impressed upon the factory owners and the use of coke is advised in the case of small industrial concerns.

Smoke nuisance from the stationary chimneys of the B. B. & C. I. Railway and the G. I. P. Railway has steadily decreased and the nuisance from the locomotive funnels has been almost entirely eradicated as the result of the electrification of the local service.

Though shipping improved during the year under report the smoke nuisance in the Dock area was within permissible limits. A few offenders were served with prompt notices which had the desired effect.

The problem of domestic smoke is not controlled by the Smoke Nuisances Commission as this is dealt with by the Health Department of the Bombay Municipality. It is difficult to say what proportion of smoke nuisance is due to domestic and industrial smoke but considerable nuisance is caused by fire-places in private houses. This can be minimised by the use of gas and electricity both of which are easily availably to consumers in Bombay. Hotels and restaurants are invariably advised to use either of these means to avoid complaints from neighbouring residents.

6. In Karachi the total number of observations and visits as compared with the last year's figures showed a decrease which was due to the transfers of Inspectors. The average emission of smoke for the year under report was less than in the previous year.

7. In Ahmedabad the number of observations, visits to factories and tests of appliances showed an increase over the last year's figures. The average emission of smoke was also less than the previous year.

8. The emission of smoke is recorded according to the following table :—

Scale No. 1	..	..	.. No smoke.
,, No. 2	..	..	.. Light grey.
,, No. 3	..	..	.. Grey.
,, No. 4	..	..	.. Very dark grey.
,, No. 5	..	..	.. Black.
,, No. 6	..	..	.. Dense black.

For the purpose of smoke nuisances inspection, only scales Nos. 4, 5 and 6 are important. In Bombay and other areas to which the Act has been applied, the emission of dense black smoke (scale No. 6) is prohibited. Scales Nos. 5 and 4 are related to scale No. 6 as follows :—

One minute of scale No. 5 (black smoke) is taken as equal to ·55 minute of scale No. 6 (dense black smoke) and one minute of scale No. 4 (very dark grey) is taken as equal to ·37 minute of scale No. 6.

On this basis the average emission of smoke was equal to ·377 minute per hour of dense black smoke for each of the 1,946 observations of the chimneys per hour in Bombay as compared with ·392 minute per hour in the preceding year.

For each of the 243 observations of the chimneys for one hour at Karachi during the year the average emission was equal to ·836 minute per hour of dense black smoke as against 1·554 minutes per hour for the preceding year.

For each of 1,513 observations of the chimneys for one hour at Ahmedabad, the average emission was equal to ·97 minute per hour as compared with 1·52 per hour for the preceding year.

9. There were at the close of the year 944 stationary chimneys in Bombay Island and Kurla, 51 in Karachi and 153 in Ahmedabad on the Register of the Commission. The above figures represent the number of existing chimneys only, those removed being struck off the Register. During the year 103 chimneys were added to the Register in Bombay, none at Karachi and 5 at Ahmedabad. In addition to the registered stationary chimneys there is a large number of portable chimneys controlled by the Commission such as those connected to railway locomotives, road-rollers, portable engines, steam ships and launches, etc.

10. Observations are taken daily of the smoke emitted from the various chimneys to see that it does not exceed the limits prescribed under the Rules. For the purpose of comparison and record a series of observations of one hour duration are taken from which is compiled an average emission for each month and subsequently an average for the year. This average is taken as representative of the total smoke emissions for the area throughout the year. The following table shows the

yearly average emission of smoke for Bombay, Karachi and Ahmedabad since the statistics have been maintained :—

BOMBAY.

Year.	Scales Nos. 6, 5 and 4 reduced to Scale No. 6, i.e. dense black, minutes per hour.
1913 February	11·6
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1914 ,, ...	1·86
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1917 ,, ...	1·235
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1920 ,, ...	1·254
1921 ,, ...	1·406
1922 ,, ...	1·82
1923 ,, ...	1·55
1924 ,, ...	1·949
1925 ,, ...	1·416
1926 ,, ...	1·146
1927 ,, ...	1·26
1928 ,, ...	1·104
1929 ,, ...	·61
1930 ,, ...	·51
1931 ,, ...	·477
1932 ,, ...	·623
1933 ,, ...	·430
1934 ,, ...	·392
1935 ,, ...	·377

KARACHI.

1922 (October 1921 to March 1922)	4·538
1923 March	2·221
1924 ,, ...	1·804
1925 ,, ...	2·37
1926 ,, ...	4·57
1927 ,, ...	2·765
1928 ,, ...	2·432
1929 ,, ...	1·705
1930 ,, ...	1·493
1931 ,, ...	1·207
1932 ,, ...	1·411
1933 ,, ...	1·283
1934 ,, ...	1·554
1935 ,, ...	·836

AHMEDABAD.

1924	(November 1923 to March 1924)	..	..	..	6·56
1925	March	..	..	..	3·95
1926	,,	..	..	..	3·5
1927	,,	..	..	..	2·68
1928	,,	..	..	..	2·63
1929	,,	..	..	..	2·00
1930	,,	..	..	..	2·23
1931	,,	..	..	..	1·4
1932	,,	..	..	..	1·59
1933	,,	..	..	..	1·73
1934	,,	..	..	..	1·52
1935	,,	..	..	..	·97

11. The following notices and warnings were issued during the year :—

	—	Notices.	Intimations.	Statutory warnings.
Bombay ..	Factories	139	3	2
	Locomotives	1	*Nil*	*Nil*
	Steam Lorries, Road-Rollers, Cranes and single boilers ..	27	*Nil*	*Nil*
	Steam ships	45	1	*Nil*
	Tugs and Launches ..	1	*Nil*	*Nil*
Karachi ..	Factories	3	*Nil*	*Nil*
	Locomotives	3	*Nil*	*Nil*
	Steam ships	7	*Nil*	*Nil*
Ahmedabad ..	Factories	128	*Nil*	1
	Locomotives	26	*Nil*	*Nil*
	Road-Rollers, Cranes and single boilers ..	*Nil*	*Nil*	*Nil*

12. Forty complaints were received from the public in Bombay during the year and all possible steps were taken to minimise the nuisance complained of. The majority of complaints were against small concerns.

No complaints were received from the public at Karachi while only one was received at Ahmedabad.

13. In Bombay three prosecutions were filed during the year. The managers and engineers of the Jam Mills, Lal Baug, Parel, and the Victoria Mills, Gamdevi, were charged under Rule 23 (3) for excessive smoke emission from the mill chimneys. In each case the offenders were convicted and the engineers were fined Rs. 50 and Rs. 40 respectively while the manager of the Victoria Mills was fined Rs. 15.

The owner of a small dyeing works was charged under section 9A (2) for the use of furnaces not approved by the Smoke Nuisances Commission ; he was convicted and fined Rs. 20.

No prosecutions were instituted at Karachi or at Ahmedabad.

„ 14. During the year the Commission examined at Bombay six plans of proposed flues and chimneys, seven at Ahmedabad and one at Karachi. The plans submitted at Bombay were in connection with new concerns. Of the seven plans of flues and chimneys dealt with under section 9A of the Act at Ahmedabad two related to new concerns and the remainder, also one at Karachi, were for additions and alterations in existing plants.

15. For the first time since the Bombay Smoke Nuisances Act came into operation in 1913 an attempt was made during the year under review to ascertain by scientific means the extent of the air pollution in the city. Mr. Y. G. Naik, M.Sc., of the Royal Institute of Science was authorised by the Smoke Nuisances Commission to carry out the investigation and his reports are in the following appendix.

The method adopted was to calculate the number of particles in 1 cubic centimetre of air taken from various parts of the city and as this has been done in many industrial towns in the United Kingdom by somewhat similar apparatus it is possible to compare the results.

The first observations were taken over a period of seven days from 28th March 1934, samples of air being taken at six different places in the mornings and evenings. The graphs and tabulated readings are shown in Mr. Naik's report and during this period the average was roughly 2,500 particles of soot or dust in the mornings which increased to 3,300 in the evenings. It will be noticed that this represents the air pollution in the industrial areas, as the particles in the air on Malabar Hill and at the Band Stand, Fort, were practically nil and accordingly the actual average for the city is less than represented by the figures given above. During the tests the wind varied from SW to NW with a velocity of 5 to 8 miles per hour.

Further tests were carried out in the same areas during the monsoon so that the amount of dust particles in the samples taken in March and April could be roughly estimated. These tests were made on several days between July 21st and August 7th while the ground was damp and weather fair. The report shows that the average was approximately 2,000 particles in the morning and 2,500 particles per cubic centimetre in the evening, the wind velocity being 7·6 to 13·4 miles per hour from SW to N Westerly direction.

From these investigations it may be deduced that in the non-monsoon periods dust is responsible for 17 per cent. of the total particles in the mornings and for 25 per cent. during the evenings as shown below :—

Morning average—

Non-monsoon	..	2,440 particles per cubic centimetre.
Monsoon	..	2,027 particles per cubic centimetre.
Decrease	..	413 or 17 per cent.

Evening average—

Non-monsoon	..	3,325 particles per cubic centimetre.
Monsoon	..	2,507 particles per cubic centimetre.
Decrease	..	818 or 25 per cent.

The remaining percentage in each case may be considered as deposit discharged from chimneys but Mr. M. Binnie, a member of the Commission, points out that " in the mill area there is discharged from the dust towers in each mill tremendous quantities of fine cotton dust, and it is quite possible that this dust has some effect on the quantity of particles per cubic centimetre and not only smoke and road dust. In the mill area fine gauze mosquito screens are loaded with this cotton dust in only a few days time, and soot or black smuts not evident. Some dust towers are much worse than others and the discharge can be reduced by baffles or cyclone dust extractors."

These results will bear comparison with industrial towns in the United Kingdom. According to the reports of the Meteorological Office, Air Ministry, London, tests taken in various cities on similar lines give results as follows :—

Stoke	..	7,500 particles per cubic centimetre.
Hull	..	14,000 particles per cubic centimetre.
Sheffield	..	30,000 particles per cubic centimetre.

A considerable number of tests have been taken in London and while these in normal periods show an average of 5,000, it is generally between 20,000 and 50,000 during foggy weather.

The work carried out by Mr. Naik has been valuable and instructive and it is hoped at a later date that further scientific tests will be made whereby the deposit or impurities in the atmosphere may be analysed.

16. Mr. J. Pratt was in charge of the office of the Chief Inspector of Steam Boilers and Smoke Nuisances throughout the year.

Messrs. Thaker and Cubbon were in charge of the smoke nuisances work at Bombay and Ahmedabad respectively and Messrs. Gazdar (from 1st April 1934 to 11th April 1934) and Tuffield from 12th April 1934 to 31st March 1935) dealt with the smoke nuisances work at Karachi during the year.

The Commission was satisfied with the work done by the staff.

The thanks of the Commission are due to the Mill and factory-owners, heads of engineering departments, public bodies, shipping agencies, etc., for their cordial co-operation with the Inspectors in securing the abatement of smoke nuisance by dealing departmentally with drivers and firemen found to be careless in causing unnecessary smoke.

J. F. GENNINGS,
Commissioner of Labour and President,
Bombay Smoke Nuisances Commission.

Bombay, 20th June 1935.

APPENDIX.

Report on the Investigations of the Pollution of Bombay Air by Smoke.

(Y. G. Naik, M.Sc., Royal Institute of Science, Bombay.)

The investigations were taken up on the 20th March 1934. In all six places were selected for comparative measurements. The selected places were :—

(1) Band Stand, Fort Area.

(2) Phirojshah Mehta Gardens, Malbar Hills.

(3) Byculla Bridge.

(4) Lalbaug Tram Terminus.

(5) Fergusson Road, Parel.

(6) Sewri.

Only two sets of observations were taken at Band Stand and Phirojshah Gardens for comparative studies, while a series of observations, lasting for 7 days, were taken, samples of air being collected both in the mornings and evenings.

The method of estimation of smoke particles depends on the following principle. The sample of air was collected in specially designed flask and was then introduced into an observation flask known as Wilson Chamber. When sudden expansion is created in this chamber, the water vapour becomes super-saturated and a cloud is formed by the condensation of the extra water vapour on the smoke particles contained in the air sample. By observing the size of the cloud particles and the quantity of water vapour condensed the number of smoke particles in the particular sample can be estimated. The size of the cloud particles was determined by observing the diameter of the corona ring seen when looked at a source of light through the cloud. The quantity of water vapour condensed was calculated by noting the expansion created.

The results of the present investigations are given below :—

Morning Observations.

Date.			Time. A.M.	Byculla Bridge.	Lalbaug.	Fergusson Road.	Sewri.
March	29	.. ..	7—8	1,760*	1,990	2,130	2,490
	30	.. ..	6—7	2,130	1,460	2,420	2,910
	31	.. ..	6—7	2,650	2,640	3,290	5,030
April	1	.. ..	7—8	1,860	2,920	4,240	1,500
	2	.. ..	8—9	1,400	1,060	1,500	880
	3	.. ..	8—9	1,450	1,510	2,140	3,550
	4	.. ..	7—8	2,270	2,860	4,090	4,200

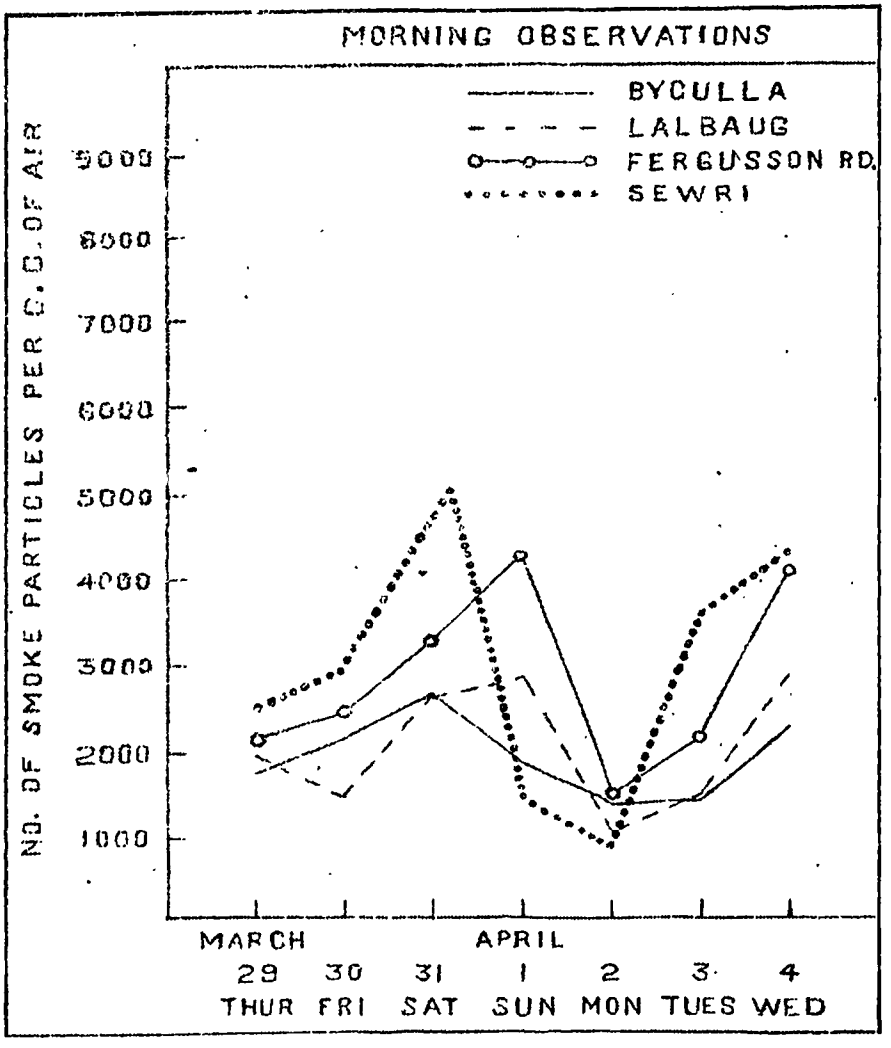
Evening Observations.

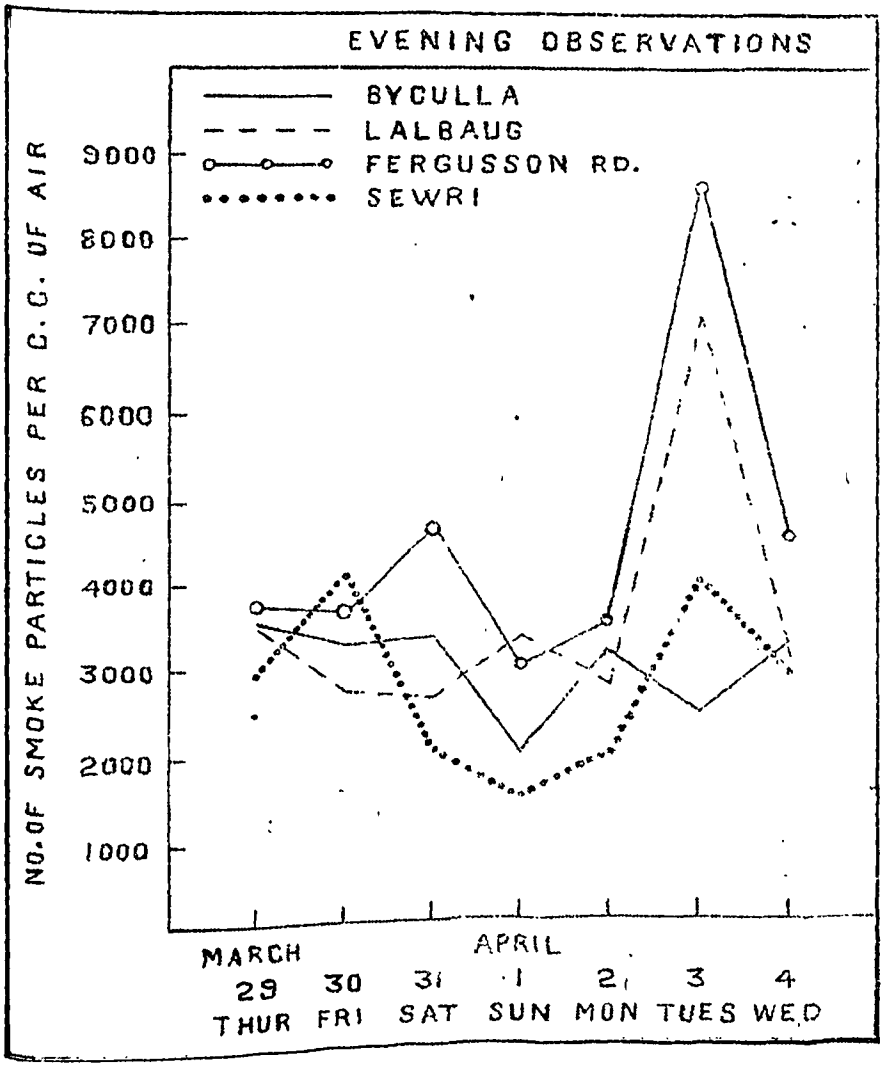
Date.	Time P.M.	Byculla Bridge.	Lalbaug.	Fergusson Road.	Sewri.
March 29	7—8	3,540	3,490	3,750	2,920
30	8—9	3,290	2,760	3,680	4,090
31	10—11	3,360	2,640	4,660	2,060
April 1	7—8	1,990	3,300	1,990	1,490
2	9—10	3,100	2,730	3,410	1,990
3	7—8	3,420	7,050	8,630	3,980
4	7—8	3,230	3,040	4,500	2,020

* The number under each centre represents the number of smoke particles per cubic centimetre of air.

The samples of air from Band Stand and Phirojshah Mehta Gardens did not give rise to any cloud in the observation flask, indicating thereby that the number of smoke particles must be less than 100 per cubic centimetre which is the least number observable with this apparatus.

For comparative study of smoke pollution at various places, a number of graphs of all the above observations and the interpretations are given below.




EVENING OBSERVATIONS
BYCULLA
LALBAUG
FERGUSSON RD.
SEWRI
NO. OF SMOKE PARTICLES PER C.C. OF AIR
9000
8000
7000
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3000
2000
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MARCH
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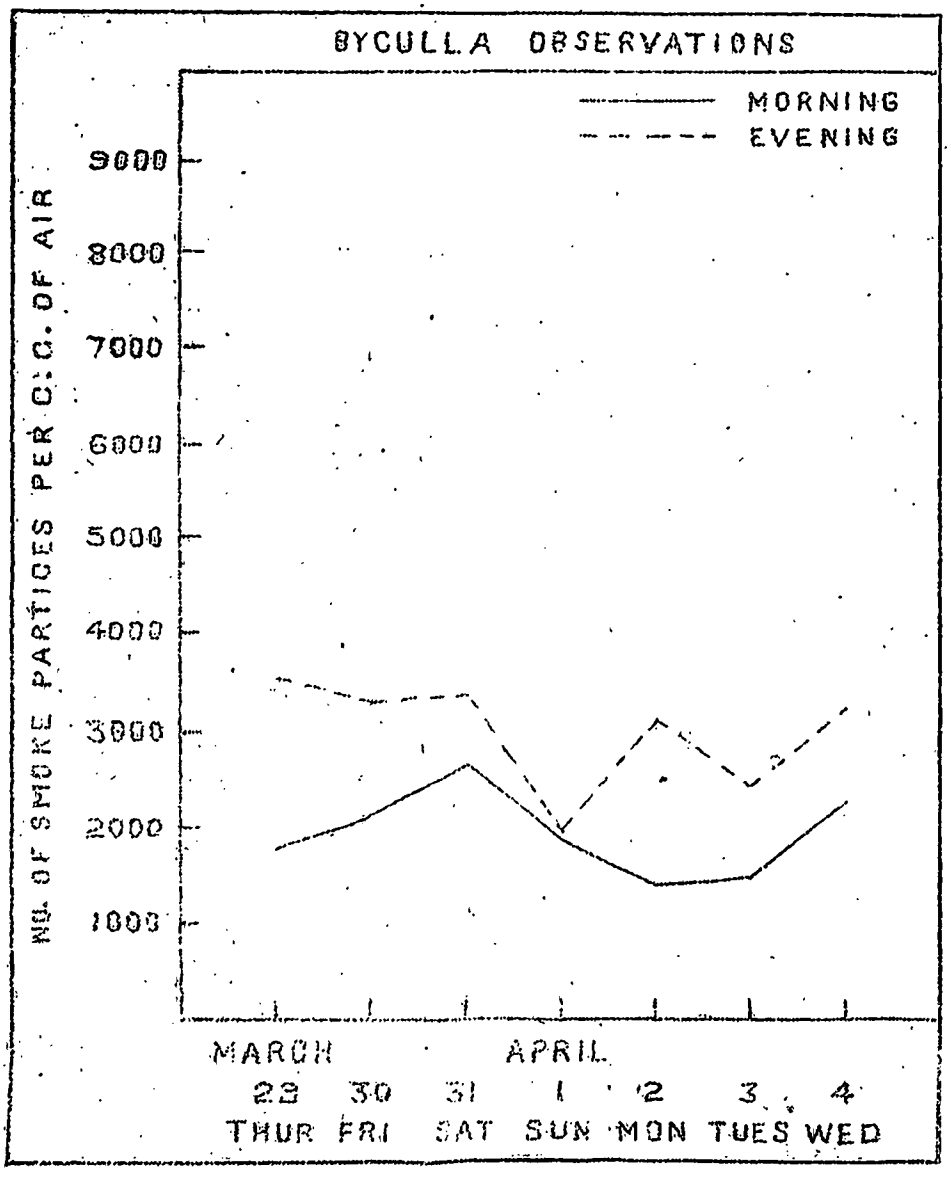
29 30 31 1 2 3 4
THUR FRI SAT SUN MON TUES WED


BYCULLA OBSERVATIONS
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NO. OF SMOKE PARTICES PER C.C. OF AIR
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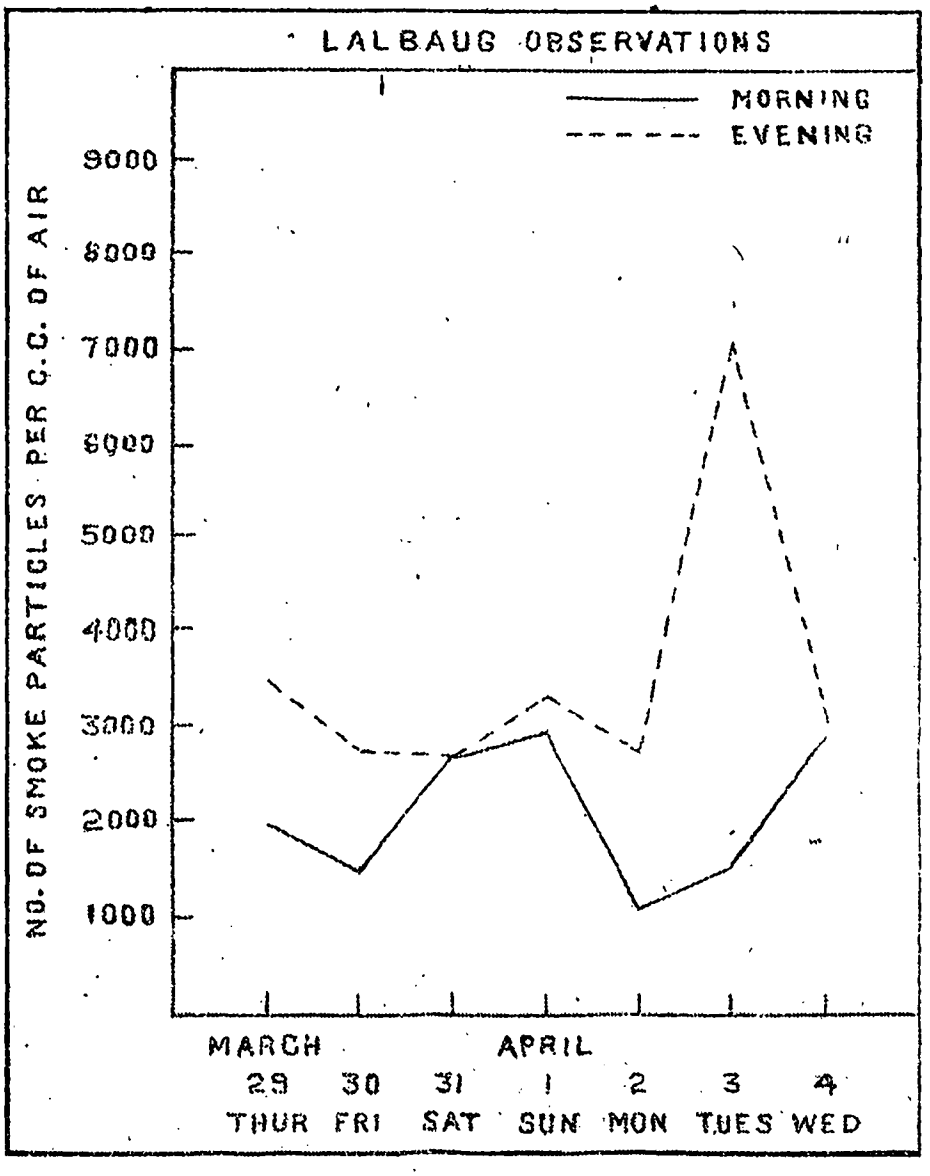
THUR FRI SAT SUN MON TUES WED


LALBAUG OBSERVATIONS
MORNING
EVENING
NO. OF SMOKE PARTICLES PER C.C. OF AIR
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MARCH
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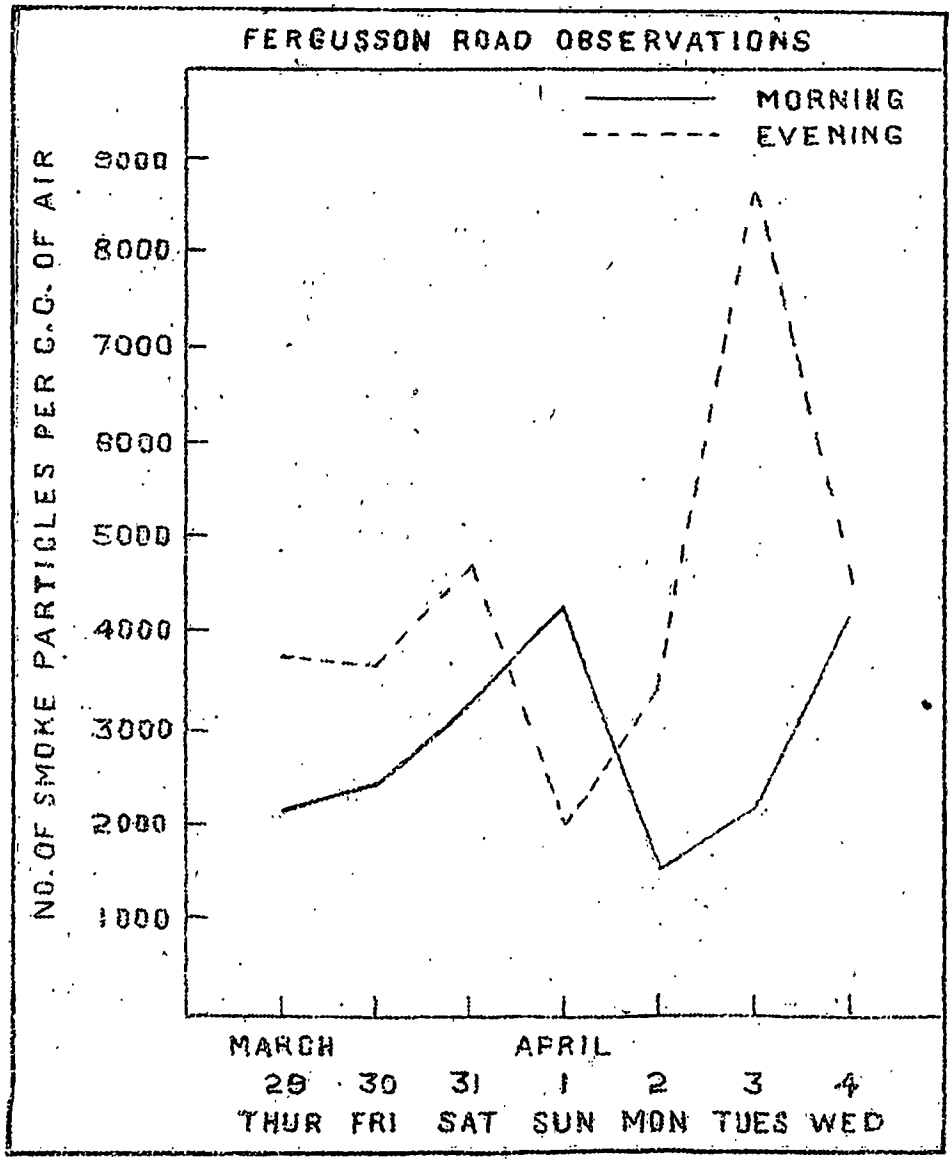
THUR FRI SAT SUN MON TUES WED


FERGUSSON ROAD OBSERVATIONS
MORNING
EVENING
NO. OF SMOKE PARTICLES PER C.C. OF AIR
9000
8000
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4000
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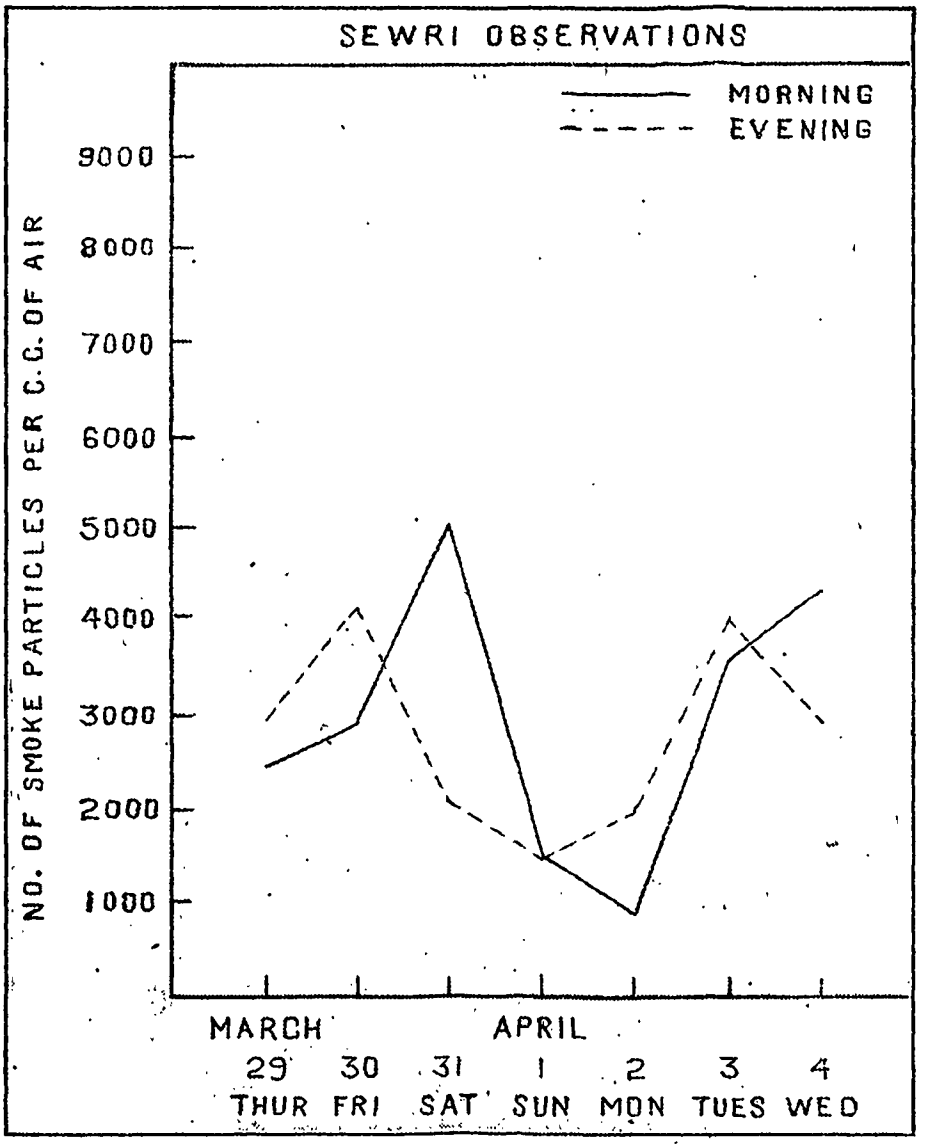
MARCH
APRIL
29 30 31 1 2 3 4
THUR FRI SAT SUN MON TUES WED


SEWRI OBSERVATIONS
MORNING
EVENING
NO. OF SMOKE PARTICLES PER C.C. OF AIR
9000
8000
7000
6000
5000
4000
3000
2000
1000
MARCH
APRIL
29 30 31 1 2 3 4
THUR FRI SAT SUN MON TUES WED

The morning graphs for Sewri show a remarkable phenomenon :—

(I) The evening pollution is less but the morning pollution on week days except Sundays and Mondays is considerably higher than at other places. (II) On Monday, however, the morning pollution is the least of all. Both these facts can be explained if we suppose that during night, the wind carrying smoke from Parel locality drifts towards the East and causes a greater pollution towards that side. The sudden decrease in pollution on Monday may be traced to the fact that on Sunday the mills remain closed and that there is practically no traffic in that area.

From the evening graphs, it is quite evident that :

(I) The Fergusson Road locality is more affected by smoke than any other. The smoke pollution can, on average, be taken in the following increasing order :—

(*i*) Sewri, (*ii*) Byculla, (*iii*) Lalbaug, (*iv*) Fergusson Road.

(II) The number of smoke particles in general varies at all these places between 2,000 to 4,000 particles per cubic centimetre of air. On the 3rd April, however, there is a sudden increase to be observed in Lalbaug and Fergusson Road areas. Sewri shows the least pollution on an average.

Part of the pollution at Byculla and Lalbaug may be attributed to the heavy volumes of traffic, whereas the pollution at Fergusson Road may be principally due to the smoke discharged by the mills.

In general an idea of smoke pollution can be had by comparing these results with those at the Band Stand and Phirojshah Mehta Gardens, where the apparatus failed to show any appreciable pollution.

Thanks are due to the authorities of the Royal Institute of Science, Bombay, for giving the necessary permission to conduct these investigations.

Monsoon Observations.

In continuation of the previous work, the present investigations were carried out mainly to study what variations take place in the number of smoke particles in the rainy season. It is possible that particles other than smoke may be eliminated under suitable conditions by rain. The observations were again taken at the four previous centres, viz. Byculla Bridge, Lalbaug, Fergusson Road and Sewri. For every observation a suitable day was selected.

The first morning observation was taken on 21st July, when there was practically no rain on the previous night, but it did rain on the preceding day. The next morning selected was 27th July.

The first evening sample of air was collected on the 26th July and on that day it rained till about 11 a.m. It was after a long interval that 7th August was found suitable for another evening observation. The whole day was dry and there was a heavy shower on the preceding night.

The results of the investigations are given below in table A. In order to compare these results with those obtained previously the average value of the number of smoke particles for both the investigations are tabulated in table B.

It is not easily possible to interpret the variations that take place at a particular place in its fullest detail unless a very prolonged investigation is carried out to study the effect of wind, traffic and rain. Still an approximate idea as to the variation due to rain can be had from these results.

TABLE A.

Centre.	Number of smoke particles per cubic centimeter.			
	Morning results.		Evening results.	
	21st July.	27th July.	26th July.	7th August.
Byculla Bridge	2,490	2,270	3,240*	2,280
Lalbaug	2,030	2,390	1,490	2,940
Fergusson Road	2,030	2,490	2,880	3,170
Sewri	990	1,530	1,090	2,390

TABLE B.

Centre.	Average number of smoke particles per cubic centimeter.			
	Morning results.		Evening results.	
	Previous.	Monsoon.	Previous.	Monsoon.
Byculla Bridge	1,930	2,380	2,990	3,050
Lalbaug	2,060	2,210	3,570	2,215
Fergusson Road	2,830	2,260	3,950	3,025
Sewri	2,940	1,260	2,780	1,740

From table A it is evident that the number of smoke particles in the evening is higher than the number in the morning.

From the average results in table B it appears that there is no uniform variation in the number of smoke particles in the morning on account of rain.

The evening averages, however, point out clearly that there is a regular decrease in the number of smoke particles to the extent of about 1,000 to 1,200 per cubic centimeter with the only exception of Byculla on account of the result marked (*) in Table A.

We can therefore assume that the number of particles other than of smoke are not more than about 1,200 per cubic centimeter.

MO-III Bk R 18—3

BOMBAY : PRINTED AT THE GOVERNMENT CENTRAL PRESS.

m-24-7-36

Hon. the Home and General Member.

Twenty-third Annual Report of the Bombay Smoke-nuisances Commission

For the Year 1935-36

BOMBAY
PRINTED AT THE GOVERNMENT CENTRAL PRESS
1936

Obtainable from the Superintendent, Government Printing and Stationery, Bombay, or through the High Commissioner for India, India House, Aldwych, London, W.C.2, or through any recognised Bookseller

[Price—Anna 1 or 1*d.*]

TWENTY-THIRD ANNUAL REPORT OF THE BOMBAY SMOKE NUISANCES COMMISSION FOR THE YEAR 1935-36.

1. This report covers the period from 1st April 1935 to 31st March 1936. The Commission consisted of the following members :—

President.

(1) Mr. J. F. Gennings, C.B.E., Bar-at-Law, Commissioner of Labour, from 1st April 1935 to 15th March 1936. Mr. S. R. Deshpande, B.A., B. Litt. (Oxon.), Officiating Commissioner of Labour, from 16th March 1936 to 31st March 1936.	*Ex-officio.*

Members.

(2) Mr. P. B. Advani, M.Sc.	Nominated by Government.
(3) Mr. R. B. McGregor	
(4) Mr. E. G. Cameron	
(5) Mr. W. F. Webb, M.I. Marc. E. ..	Elected by the Bombay Mill-owners' Association.
(6) Mr. Mark Binnie	
(7) Mr. H. F. Milne	Elected by the Chamber of Commerce, Bombay.

SUB-COMMITTEE FOR KARACHI.

Chairman.

(1) Mr. E. G. Taylor, I.C.S., Collector of Karachi.	*Ex-officio.*

Members.

(2) Mr. H. W. Huggins, from 1st April 1935 to 31st December 1935. Mr. S. E. Naylor, from 1st January 1936 to 31st March 1936.	Nominated by Government.
(3) Mr. J. H. Patel	Elected by the Karachi Municipality.

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(4) Mr. G. N. Gokhale, B.Sc., L.C.E., M.I.E. (Ind.), I.S.E. (Retired), from 1st April 1935 to 31st December 1935. Prof. S. B. Junnarkar, B.Sc. (London), from 1st January 1936 to 31st March 1936.	Elected by the Factory Owners, Karachi.

SUB-COMMITTEE FOR AHMEDABAD.

Chairman.

(1) Mr. A. H. Dracup, B.A. (Cantab.), Collector of Ahmedabad, from 1st April 1935 to 17th October 1935. Mr. D. R. Pradhan, I.C.S., Collector of Ahmedabad, from 18th October 1935 to 15th November 1935. Mr. V. S. Bhide, I.C.S., Collector of Ahmedabad, from 16th November 1935 to 31st March 1936.	*Ex-officio.*

Members.

(2) Mr. Ambarnath Bhattacharya, Executive Engineer, Ahmedabad Division, from 1st April 1935 to 11th April 1935. Rao Saheb S. G. Pandya, Executive Engineer, Ahmedabad Division, from 12th April 1935 to 11th June 1935. Mr. R. G. Sule, Executive Engineer, Ahmedabad Division, from 12th June 1935 to 31st March 1936.	*Ex-officio.*
(3) Colonel Sir B. H. Nanavaty, Kt., C.I.E., from 1st April 1935 to 31st December 1935. Mr. Hariprasad V. Desai, from 1st January 1936 to 31st March 1936.	Elected by the Ahmedabad Municipality.
(4) Seth Sakarlal Balabhai, M.L.C. ..	Elected by the Millowners' Association, Ahmedabad.

2. During the year two meetings of the Commission were held at Bombay, one at Ahmedabad and one at Karachi.

3. In Bombay the time of one Inspector was mainly devoted to smoke nuisances inspection throughout the year.

In Karachi and Ahmedabad the work was done by Inspectors in addition to their boiler inspection work.

4. The following table summarises and compares the work of the year and that of the preceding year in the three areas :—

		Observations of chimneys.	Visits to factories.	Test of appliances
Bombay	1934–35	3,658	822	58
	1935–36	2,484	554	109
Karachi	1934–35	244	267	*Nil*
	1935–36	347	427	*Nil*
Ahmedabad	1934–35	1,671	746	10
	1935–36	1,266	694	13
Total	1934–35	5,573	1,835	68
	1935–36	4,097	1,675	122

5. A change of personnel during the year under report is largely responsible for the considerable variations in the comparative figures of the last two years. Almost all the observations taken were of a full hour's duration and those factories which were consistent offenders were visited and in such cases valuable data collected which helped towards minimising smoke nuisance. In many instances the collection of such data proved to the mill or factory authorities that an increase of their boiler power would solve the problem of excessive smoke emission. Appliances for testing furnace draught, flue temperature and analysis of flue gases were freely utilised during the year. This in addition to being useful in bringing about an abatement of smoke was also a great help to the owners in effecting economies in the fuel consumption of their plants. It is satisfactory to be able to state that in every instance, the fullest co-operation was extended by the mill and factory authorities.

Complaints regarding smoke nuisance forwarded by the Municipality show a steady tendency to decrease. By far the greatest number of complaints related to nuisances from metal casting bhutties, so much so that it became necessary to take up the question with the Municipality for amending the license laws governing this trade by refusing the use of premises for this purpose where there were dwellings overhead.

6. In Karachi a marked increase in the number of observations and visits is shown with a corresponding decline in the average smoke limit.

7. Ahmedabad like Bombay experienced a change of Inspectors and the observations and visits recorded were lower in consequence than the previous year. The Inspector in Ahmedabad draws attention to the fact that it is gratifying to record that increasing interest is shown by factory owners to minimise smoke nuisance which results ultimately in economic gain to themselves and a general improvement of the public health.

8. The emission of smoke is recorded according to the following table :—

Scale No. 1	..	..	..	No smoke.
„ No. 2	..	..	..	Light grey.
„ No. 3	..	..	..	Grey.
„ No. 4	..	..	..	Very dark grey.
„ No. 5	..	..	..	Black.
„ No. 6	..	..	..	Dense black.

For the purpose of smoke nuisance inspection, only scales Nos. 4, 5 and 6 are important. In Bombay and other areas to which the Act has been applied, the emission of dense black smoke (scale No. 6) is prohibited. Scales Nos. 5 and 4 are related to scale No. 6 as follows :—

One minute of scale No. 5 (black smoke) is taken as equal to ·55 minute of scale No. 6 (dense black smoke) and one minute of scale No. 4 (very dark grey) is taken as equal to ·37 minute of scale No. 6.

On this basis the average emission of smoke was equal to ·411 minute per hour of dense black smoke for each of the 2,349 observations of the chimneys per hour in Bombay as compared with ·377 minute per hour in the preceding year.

For each of the 345 observations of the chimneys for one hour at Karachi during the year, the average emission was equal to ·776 minute per hour of dense black smoke as against ·836 minute per hour for the preceding year.

For each of 1,140 observations of the chimneys for one hour at Ahmedabad, the average emission was equal to ·99 minute per hour as compared with ·97 per hour for the preceding year.

9. There were at the close of the year 1,003 stationary chimneys in Bombay Island and Kurla, 52 in Karachi and 146 in Ahmedabad on the Register of the Commission. The above figures represent the number of existing chimneys only, those removed being struck off the Register. During the year 59 chimneys were added to the Register in Bombay, one at Karachi and three at Ahmedabad. In addition to the registered stationary chimneys, there is a large number of portable chimneys controlled by the Commission such as those connected to railway locomotives, road-rollers, portable engines, steamships and launches, etc.

10. Observations are taken daily of the smoke emitted from the various chimneys to see that they do not exceed the limits prescribed under the Rules. For the purpose of comparison and record, a series of observations of one hour duration are taken, from which is compiled an average emission for each month and subsequently an average for the year. This total is taken as representative of the average smoke emissions for the area throughout the year. The following table shows the yearly

average emission of smoke for Bombay, Karachi and Ahmedabad since statistics have been maintained :—

BOMBAY.

Year.	Scales Nos. 6, 5 and 4 reduced to scale No. 6, *i.e.*, dense black, minutes per hour.
1913 February	11·6
1913 March	6·5
1914 ,, ...	1·86
1915 ,, ...	1·474
1916 ,, ...	1·432
1917 ,, ...	1·235
1918 ,, ...	1·203
1919 ,, ...	1·144
1920 ,, ...	1·254
1921 ,, ...	1·406
1922 ,, ...	1·82
1923 ,, ...	1·55
1924 ,, ...	1·949
1925 ,, ...	1·416
1926 ,, ...	1·146
1927 ,, ...	1·26
1928 ,, ...	1·104
1929 ,, ...	·61
1930 ,, ...	·51
1931 ,, ...	·477
1932 ,, ...	·623
1933 ,, ...	·430
1934 ,, ...	·392
1935 ,, ...	·377
1936 ,, ...	·411

KARACHI.

1922 (October 1921 to March 1922)	4·538
1923 March	2·221
1924 ,, ...	1·804
1925 ,, ...	2·37
1926 ,, ...	4·57
1927 ,, ...	2·765
1928 ,, ...	2·432
1929 ,, ...	1·705
1930 ,, ...	1·493
1931 ,, ...	1·207
1932 ,, ...	1·411
1933 ,, ...	1·283

Year.	Scales Nos. 6, 5 and 4 reduced to scale No. 6, *i.e.*, dense black, minutes per hour.
1934 March	1·554
1935 „	·836
1936 „	·776

AHMEDABAD.

1924 (November 1923 to March 1924)	6·56
1925 March	3·95
1926 „	3·5
1927 „	2·68
1928 „	2·63
1929 „	2·00
1930 „	2·23
1931 „	1·4
1932 „	1·59
1933 „	1·73
1934 „	1·52
1935 „	·97
1936 „	·99

11. The following notices and warnings were issued during the year :—

—		Notices.	Intimations.	Statutory warnings.
Bombay ..	Factories	448	26	25
	Locomotives	2	*Nil*	*Nil*
	Steam Lorries, Road-Rollers, Cranes and single boilers	16	3	2
	Steamships	1	*Nil*	*Nil*
	Tugs and Launches ..	*Nil*	*Nil*	*Nil*
Karachi ..	Factories	4	1	*Nil*
	Locomotives	*Nil*	*Nil*	*Nil*
	Steamships	8	1	*Nil*
Ahmedabad ..	Factories	127	1	6
	Locomotives	5	*Nil*	*Nil*
	Road-Rollers, Cranes and single boilers	*Nil*	*Nil*	*Nil*

12. Twenty-nine complaints were received from the public in Bombay during the year and all possible steps were taken to minimise the nuisance complained of. Almost all these complaints were against small concerns.

One complaint was received from the public at Karachi while no complaint was received at Ahmedabad.

13. In Bombay two prosecutions were filed during the year. The managers and engineers of the Victoria Mills, Limited, Gamdevi, and the Khatau Makanji Spinning and Weaving Mills, Company, Limited, Byculla, were charged under Rule 23 (3) for excessive smoke emission from the mill chimneys. In both the cases the offenders were convicted and the manager and engineer of the former were fined Rs. 105 each for seven consecutive offences at the rate of Rs. 15 per offence, while the manager and engineer of the latter mill were fined Rs. 5 and Rs. 20 respectively.

No prosecutions were instituted at Karachi or at Ahmedabad.

14. During the year the Commission examined at Bombay thirteen plans of proposed flues and chimneys, two at Ahmedabad and none at Karachi. Out of the thirteen plans of flues and chimneys dealt with under Section 9A (*1*) of the Act at Bombay, twelve related to new concerns and the remaining one and two at Ahmedabad were for alterations and additions to existing plants.

15. Mr. J. Pratt was in charge of the office of the Chief Inspector of Steam Boilers and Smoke Nuisances throughout the year.

Messrs. Thaker (from 1st April 1935 to 22nd April 1935) and Everett (from 23rd April 1935 to 31st March 1936) were in charge of the smoke nuisances work at Bombay, Messrs. Cubbon (from 1st April 1935 to 30th September 1935) and Thaker (from 1st October 1935 to 31st March 1936) at Ahmedabad, while Mr. A. J. Tuffield dealt with the smoke nuisance work at Karachi during the year.

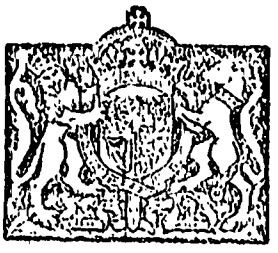
The Commission was satisfied with the work done by the staff.

The thanks of the Commission are due to the mill and factory owners, heads of engineering departments, public bodies, shipping agencies, etc., for their cordial co-operation with the Inspectors in securing the abatement of smoke nuisance, by dealing departmentally with negligent drivers and firemen responsible for causing unnecessary smoke.

A. H. DRACUP,
Officiating Commissioner of Labour
and President, Bombay Smoke
Nuisances Commission.

Bombay, 26th May 1926.

BOMBAY : PRINTED AT THE GOVERNMENT CENTRAL PRESS.



Twenty-fourth Annual Report of the Bombay Smoke-nuisances Commission

For the Year 1936-37

BOMBAY
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1937

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[Price—Anna 1 *or* 1*d.*]

TWENTY-FOURTH ANNUAL REPORT OF THE BOMBAY SMOKE NUISANCES COMMISSION FOR THE YEAR 1936-37.

1. This report covers the period from 1st April 1936 to 31st March 1937. The Commission consisted of the following members :—

President.

(1) Mr. S. R. Deshpande, B.A., B.Litt. (Oxon.), Officiating Commissioner of Labour, from 1st April 1936 to 24th April 1936.	*Ex-officio.*
Mr. A. H. Dracup, B.A., (Cantab.), Officiating Commissioner of Labour, from 25th April 1936 to 12th October 1936.	
Mr. J. F. Gennings, C.B.E., Bar-at-Law, Commissioner of Labour, from 13th October 1936 to 31st March 1937.	

Members.

(2) Mr. P. B. Advani, M.Sc.	Nominated by Government.
(3) Mr. R. B. McGregor	
(4) Mr. E. G. Cameron	
(5) Mr. W. F. Webb, M.I.Mar.E.	Elected by the Bombay Mill-owners' Association.
(6) Mr. Mark Binnie	
(7) Mr. H. F. Milne	Elected by the Chamber of Commerce, Bombay.

SUB-COMMITTEE FOR AHMEDABAD.

Chairman.

(1) Mr. V. S. Bhide, I.C.S., Collector of Ahmedabad, from 1st April 1936 to 20th December 1936.	*Ex-officio.*
Mr. D. MacLachlan, I.C.S., Collector of Ahmedabad, from 21st December 1936 to 31st March 1937.	

Members.

(2) Mr. R. G. Sule, Executive Engineer, Ahmedabad Division ..	..	*Ex-officio.*
(3) Mr. Hariprasad Vrijrai Desai	..	Elected by the Ahmedabad Municipality.
(4) Sheth Sakarlal Balabhai, M.L.C.	..	Elected by the Millowners' Association, Ahmedabad.

2. During the year two meetings of the Commission were held in Bombay and one at Ahmedabad.

3. In Bombay the time of one Inspector was mainly devoted to smoke nuisances inspection throughout the year.

In Ahmedabad the work was done by the Inspector in addition to his boiler inspection work.

4. The following table summarises and compares the work of the year and that of the preceding year in the two areas :—

		Observations of chimneys.	Visits to factories.	Tests of appliances.
Bombay ..	1935–36 ..	2,484	554	109
	1936–37 ..	2,586	502	206
Ahmedabad ..	1935–36 ..	1,266	694	13
	1936–37 ..	1,509	692	23
Total ..	1935–36 ..	3,750	1,248	122
	1936–37 ..	4,095	1,194	229

5. During the year under report several mills changed from coal to oil fuel. The latter has the merit of being almost smokeless. The number of complaints forwarded by the Municipality and by the public direct to this office showed no appreciable difference from that of last year.

6. The Inspector at Ahmedabad again reports that he is receiving the fullest support from the factory owners in adopting any measures which have the abatement of smoke nuisance as their ultimate aim.

7. The emission of smoke is recorded according to the following table :—

Scale No. 1	.. .. ..	No smoke.
,, No. 2	.. .. ..	Light grey.
,, No. 3	.. .. ..	Grey.
,, No. 4	.. .. ..	Very dark grey.
,, No. 5	.. .. ..	Black.
,, No. 6	.. .. ..	Dense black.

For the purpose of smoke nuisance inspection, only scales Nos. 4, 5 and 6 are important. In Bombay and other areas to which the Act has been applied, the emission of dense black smoke (Scale No. 6) is prohibited. Scales Nos. 5 and 4 are related to scale No. 6 as follows :—

One minute of scale No. 5 (black smoke) is taken as equal to ·55 minute of scale No. 6 (dense black smoke) and one minute of scale No. 4 (very dark grey) is taken as equal to ·37 minute of scale No. 6.

On this basis the average emission of smoke was equal to ·499 minute per hour of dense black smoke for each of the 2,265 observations of the chimneys per hour in Bombay as compared with ·411 minute per hour in the preceding year.

For each of the 1,122 observations of the chimneys for one hour at Ahmedabad, the average emission was equal to ·99 minute per hour, the same as for the preceding year.

8. There were at the close of the year 1,046 stationary chimneys in Bombay Island and Kurla and 147 in Ahmedabad on the Register of the Commission. The above figures represent the number of existing chimneys only, those removed being struck off the Register. During the year 45 chimneys were added to the Register in Bombay and 3 at Ahmedabad. In addition to the registered stationary chimneys, there are many portable chimneys controlled by the Commission such as those connected to railway locomotives, road-rollers, portable engines, steamships and launches, etc.

9. Observations are taken daily of the smoke emitted from the various chimneys to see that they do not exceed the limits prescribed under the Rules. For the purpose of comparison and record, a series of observations of one hour duration are taken, from which is compiled an average emission for each month and subsequently an average for the year. This total is taken as representative of the average smoke emissions for the area throughout the year. The following table shows the yearly average

emission of smoke for Bombay and Ahmedabad since statistics have been maintained :—

BOMBAY.

Year.	Scales Nos. 6, 5 and 4 reduced to scale No. 6, *i.e.*, dense black, minutes per hour.
1913 February	11·6
1913 March	6·5
1914 ,, ...	1·86
1915 ,, ...	1·474
1916 ,, ...	1·432
1917 ,, ...	1·235
1918 ,, ...	1·203
1919 ,, ...	1·144
1920 ,, ...	1·254
1921 ,, ...	1·406
1922 ,, ...	1·82
1923 ,, ...	1·55
1924 ,, ...	1·949
1925 ,, ...	1·416
1926 ,, ...	1·146
1927 ,, ...	1·26
1928 ,, ...	1·104
1929 ,, ...	·61
1930 ,, ...	·51
1931 ,, ...	·477
1932 ,, ...	·623
1933 ,, ...	·430
1934 ,, ...	·392
1935 ,, ...	·377
1936 ,, ...	·411
1937 ,, ...	·499

AHMEDABAD.

1924 (November 1923 to March 1924)	6·56
1925 March	3·95
1926 ,, ...	3·5
1927 ,, ...	2·68
1928 ,, ...	2·63
1929 ,, ...	2·00
1930 ,, ...	2·23
1931 ,, ...	1·4
1932 ,, ...	1·59
1933 ,, ...	1·73
1934 ,, ...	1·52
1935 ,, ...	·97
1936 ,, ...	·99
1937 ,, ...	·99

10. The following notices and warnings were issued during the year :—

		Notices.	Intimations.	Statutory warnings.
Bombay	Factories	380	10	18
	Locomotives	3	*Nil.*	*Nil.*
	Steam Lorries, Road-Rollers, Cranes and Single boilers	14	4	*Nil.*
	Steam ships	39	*Nil.*	*Nil.*
	Tugs and Launches	1	*Nil.*	*Nil.*
Ahmedabad	Factories	172	4	7
	Locomotives	1	*Nil.*	*Nil.*
	Road-Rollers, Cranes and Single boilers	*Nil.*	*Nil.*	*Nil.*

11. Thirty-one complaints were received from the public in Bombay during the year and all possible steps were taken to minimise the nuisance complained of. Almost all the complaints were against small concerns such as bakeries, laundries, eating houses, etc.

No complaints were received from the public at Ahmedabad.

12. In Bombay one prosecution was filed during the year against the New China Mills Limited, Sewree, Bombay, under Rule 23 (3) for excessive smoke emission and the boiler-attendant was fined Rs. 120 for three consecutive offences at the rate of Rs. 40 per offence.

In Ahmedabad two prosecutions were filed during the year for breach of Rule 23 (3). The agent of the Ahmedabad Jupiter Spinning, Weaving and Manufacturing Company Limited, was fined Rs. 90 for three offences at Rs. 30 per offence while the agents (two persons) of the Ahmedabad Laxmi Cotton Mills Company Limited, were fined Rs. 100 for two offences at Rs. 25 per head per offence.

The agents of the latter mills appealed against their convictions on the ground that it was wrong in Law to convict and fine two persons under the definition of the word " owner " as laid down in the Act. In the Sessions Court the appeal was summarily dismissed and the High Court also upheld the conviction.

13. During the year the Commission examined at Bombay seven plans of proposed flues and chimneys and the same number at Ahmedabad. All the seven plans related to new concerns. All the plans dealt with at Ahmedabad related to additions and alterations in existing plants.

14. Messrs. Pratt and Gazdar were in charge of the office of the Chief Inspector of Steam Boilers and Smoke Nuisances from 1st April 1936 to 30th October 1936 and from 31st October 1936 to 31st March 1937 respectively.

Mr. S. H. Thaker was in charge of the Smoke Nuisances work at Ahmedabad throughout the whole year.

The Commission was satisfied with the work done by the staff.

The thanks of the Commission are due to the mill and factory owners, heads of engineering departments, public bodies, shipping agencies, etc., for their cordial co-operation with the Inspectors in securing the abatement of smoke nuisance and by dealing departmentally with negligent drivers and firemen responsible for causing unnecessary smoke.

J. F. GENNINGS,
Commissioner of Labour and President,
Bombay Smoke Nuisances Commission.

Bombay, 3rd June 1937.

BOMBAY : PRINTED AT THE GOVERNMENT CENTRAL PRESS.

Twenty-fifth Annual Report of the Bombay Smoke-nuisances Commission

For the Year 1937-38

BOMBAY
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1938

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[Price—Anna 1 *or* 1*d*.]

TWENTY-FIFTH ANNUAL REPORT OF THE BOMBAY SMOKE NUISANCES COMMISSION FOR THE YEAR 1937-38.

This report covers the period from 1st April 1937 to 31st March 1938. The Commission consisted of the following members :—

President.

(1) Mr. J. F. Gennings, C.B.E., Bar-at-Law, Commissioner of Labour. — *Ex-officio.*

Members.

(2) Mr. P. B. Advani, M.Sc. ..
(3) Mr. R. B. McGregor ..
(4) Mr. E. G. Cameron .. — Nominated by Government.

(5) Mr. W. F. Webb, M.I. Mar.E. ..
(6) Mr. Mark Binnie .. — Elected by the Bombay Mill-owners' Association.

(7) Mr. H. F. Milne .. — Elected by the Chamber of Commerce, Bombay.

SUB-COMMITTEE FOR AHMEDABAD.

Chairman.

(1) Mr. D. MacLachlan, I.C.S., Collector of Ahmedabad, from 1st April 1937 to 26th March 1938.
Mr. G. G. Drewe, I.C.S., Collector of Ahmedabad, from 27th March 1938 to 31st March 1938. — *Ex-officio.*

Members.

(2) Mr. R. G. Sule, Executive Engineer, Ahmedabad Division, from 1st April 1937 to 21st March 1938.
Mr. B. S. Vyas, Executive Engineer, Ahmedabad Division, from 22nd March 1938 to 31st March 1938. — *Ex-officio.*

(3) Dr. Hariprasad Vrajrai Desai .. Elected by the Ahmedabad Municipality.

(4) Sheth Sakarlal Balabhai, from 1st April 1937 to 31st December 1937. Sheth Nanddas Haridas, from 1st January 1938 to 31st March 1938. } Elected by the Millowners' Association, Ahmedabad.

During the year one meeting of the Commission was held in Bombay and the Sub-Committee met once in Ahmedabad.

In Bombay the time of one Inspector was mainly devoted to smoke nuisances inspection throughout the year while in Ahmedabad the work was done by the resident Inspector in addition to his boiler inspection duties.

The following table summarises and compares the work of the year and that of preceding year in the two areas :—

		Observations of chimneys	Visits to factories.	Tests of appliances.
Bombay ..	1936–37 ..	2,586	502	206
	1937–38 ..	3,004	757	121
Ahmedabad ..	1936–37 ..	1,509	692	23
	1937–38 ..	1,826	790	26
Total ..	1936–37 ..	4,095	1,194	229
	1937–38 ..	4,830	1,547	147

The changing of the mills and factories from coal to oil fuel still continues in Bombay. The number of inspections has increased while the number of tests of appliances has decreased as compared with the figures of the last year, but visits were paid to see that the instructions issued previously were being properly attended to. The number of complaints forwarded by the Municipality and by the public direct to this office shows a slight increase.

In Ahmedabad the number of observations, visits to factories and tests of appliances showed an increase over last year's figures. During the year the scientific investigation of air pollution in Ahmedabad City on the lines carried out in Bombay in the year 1934 was sanctioned, and Mr. Y. G. Naik, M.Sc., of the Royal Institute of Science, was authorised by the Bombay Smoke Nuisances Commission to carry out the work.

The emission of smoke is recorded according to the following table :—

Scale No. 1	..	.. No smoke.
„ No. 2	..	.. Light grey.
„ No. 3	..	.. Grey.
„ No. 4	..	.. Very dark grey.
„ No. 5	..	.. Black.
„ No. 6	..	.. Dense black.

For the purpose of smoke nuisance inspection, only scales Nos. 4, 5 and 6 are important. In Bombay and other areas to which the Act has been applied the emission of dense black smoke (Scale No. 6) is prohibited. Scales Nos. 5 and 4 are related to scale No. 6 as follows :—

One minute of scale No. 5 (black smoke) is taken as equal to ·55 minute of scale No. 6 (dense black smoke) and one minute of scale No. 4 (very dark grey) is taken as equal to ·37 minute of scale No. 6.

On this basis the average emission of smoke was equal to ·493 minute per hour of dense black smoke for each of the 2,565 observations of the chimneys per hour in Bombay as compared with ·499 minute per hour in the preceding year.

For each of the 1,328 observations of the chimneys for one hour at Ahmedabad, the average emission was equal to 1·01 minutes per hour as compared with ·99 per hour for the preceding year.

There were at the close of the year 1,102 stationary chimneys in Bombay Island and Coorla and 150 in Ahmedabad on the Register of the Commission. The above figures represent the number of existing chimneys only, those removed being struck off the Register. During the year 71 chimneys were added to the Register in Bombay and 3 at Ahmedabad. In addition to the registered stationary chimneys, there are many portable chimneys controlled by the Commission such as those connected to railway locomotives, road-rollers, portable engines, steam ships and launches, etc.

Observations are taken daily of the smoke emitted from the various chimneys to see that they do not exceed the limits prescribed under the Rules. For the purpose of comparison and record a series of observations of one hour duration are taken from which is compiled an average emission for each month and subsequently an average for the year. This total is taken as representative of the average smoke emissions for the area throughout the year. The following table shows the yearly average

emission of smoke for Bombay and Ahmedabad since statistics have been maintained :—

BOMBAY.

Year.	Scales Nos. 6, 5 and 4 reduced to scale No. 6, *i.e.*, dense black, minutes per hour.
1913 February	11·6
1913 March	6·5
1914 ,,	1·86
1915 ,,	1·474
1916 ,,	1·432
1917 ,,	1·235
1918 ,,	1·203
1919 ,,	1·144
1920 ,,	1·254
1921 ,,	1·406
1922 ,,	1·82
1923 ,,	1·55
1924 ,,	1·949
1925 ,,	1·416
1926 ,,	1·146
1927 ,,	1·26
1928 ,,	1·104
1929 ,,	·61
1930 ,,	·51
1931 ,,	·477
1932 ,,	·623
1933 ,,	·430
1934 ,,	·392
1935 ,,	·377
1936 ,,	·411
1937 ,,	·499
1938 ,,	·493

AHMEDABAD.

1924 (November 1923 to March 1924)	6·56
1925 March	3·95
1926 ,,	3·5
1927 ,,	2·68
1928 ,,	2·63
1929 ,,	2·00
1930 ,,	2·23
1931 ,,	1·4
1932 ,,	1·59
1933 ,,	1·73
1934 ,,	1·52
1935 ,,	·97
1936 ,,	·99
1937 ,,	·99
1938 ,,	1·01

The following notices and warnings were issued during the year :—

		Notices.	Intimations.	Statutory warnings.
Bombay ..	Factories	429	4	4
	Locomotives	8	*Nil.*	*Nil.*
	Steam lorries, road-rollers, cranes and single boilers ..	3	*Nil.*	*Nil.*
	Steam ships	17	*Nil.*	*Nil.*
	Tugs and launches	*Nil.*	*Nil.*	*Nil.*
Ahmedabad ..	Factories	196	8	2
	Locomotives	1	*Nil.*	*Nil.*
	Road-rollers, cranes and single boilers	*Nil.*	*Nil.*	*Nil.*

Thirty-five complaints were received from the public in Bombay during the year and all possible steps were taken to minimise the nuisances complained of. Most of the complaints were against small concerns such as bakeries, sweetmeat shops, eating houses, metal casting bhuttis, etc.

No complaint was received from the public at Ahmedabad.

No prosecutions were filed during the year either in Bombay or at Ahmedabad.

During the year the Commission examined at Bombay six plans of proposed flues and chimneys and five at Ahmedabad. All the six plans in Bombay related to new concerns while the plans dealt with at Ahmedabad related to additions and alterations to the existing plants.

The thanks of the Commission are due to the mill and factory owners, heads of engineering departments, public bodies, shipping agencies, etc. for their cordial co-operation with the Inspectors in securing the abatement of smoke nuisance and by dealing departmentally with negligent drivers and firemen responsible for causing unnecessary smoke. Such co-operation is necessary if the best results are to be obtained and although domestic smoke is outside the scope of the Commission, the general public can also assist by using coke or other smokeless fuel or by adopting gas or electricity for cooking purposes.

As usual the officers of the Bombay Municipality and particularly those of the Health and Licensing Departments gave their full co-operation by forwarding complaints, supplying information regarding new and defective installations and advising complainants to get in touch with the Smoke Nuisances Department.

The Chief Inspector during a recent visit to Ahmedabad interviewed representatives of the Municipality to enlist their co-operation on the same lines, when it was decided that they should erect an observation tower equipped with a telephone, supply a smoke observer to work under the control of the resident Inspector and report cases of excessive smoke emission.

The report on the investigation carried out by Mr. Naik concerning the atmospheric condition in Ahmedabad is attached. The results do not fully agree with those obtained by the Gujarat College in 1929 as at that time it was concluded that a considerable proportion of the " fog " was due to dust and domestic smoke. It is clear however that the density and quantity of the smoke emission from the mills is excessive but with the co-operation of the officers of the Municipality it is expected that better results will be obtained.

The Commission was satisfied with the work carried out by the inspecting staff during the year.

J. F. GENNINGS,
Commissioner of Labour and President,
Bombay Smoke Nuisances Commission.

Bombay, 27th May 1938.

APPENDIX.

Report on the Investigation of the Pollution of Ahmedabad Air by Smoke.

(Y. G. Naik, M.Sc., Royal Institute of Science, Bombay.)

The present investigation is made on similar lines to the Bombay one carried out in the year 1934. The actual number of solid smoke and dust particles in one cubic centimetre of air has been found out at various centres and on two different days. The samples of air were collected in specially designed aspirator flasks. A rubber balloon was fully blown into the flask thus displacing all the air, it originally contained. The balloon was then allowed to be deflated and consequently fresh smoke-bearing air from the particular centre entered the flask. A small known volume of air from this sample was sucked into an expansion chamber, containing some water. The air in the expansion chamber was then suddenly expanded. This resulted in the formation of a cloud of water drops. Originally the expansion chamber was free from any dust or smoke particles and hence a cloud could not be formed by mere expansion. It is only when there are dust or smoke particles that a cloud is formed. Each particle serves as a centre of condensation of water. The total quantity of water condensed can be calculated by knowing the expansion. The size of the drops can be determined by observing the radius of a corona ring seen in a cloud by looking through it at a distant source of light. By knowing the above factors, the number of particles per cubic centimetre can be estimated.

The days selected for taking measurements were the 4th and 7th November. All the mills remained closed on the 3rd, 4th and 5th, being Diwali holidays. The 4th November was chosen with a view to find out the impurities in air due to causes other than mill smoke. The mills began work on the 6th November and hence the following day was quite suitable to find the total pollution on a working day. Six different centres were chosen out of which four were selected in the busy mill area and two were selected outside the city limits and mill area. The results are tabulated below. The number in each column indicates the number of particles per cubic centimetre :—

Centres.	Number of particles per cubic centimetres.		
	November 4th evening 7–8 p.m.	November 7th morning 9–10 a.m.	November 7th evening 8–9 p.m.
(1) Naroda Road	2,540	6,450	14,690
(2) Gomatipur	2,360	8,630	13,720
(3) Bhadra	4,330	8,840	14,160
(4) Kalupur	2,770	9,430	15,080
*(5) Gujrat College	2,940	3,540	9,300
*(6) Shahibag	1,455	3,450	6,158
Average from 1-4	3,000	8,440	14,410

The first columns of the results are of special importance as they were taken on a day when no smoke from the mills could be expected to be present in the atmosphere. Whatever amount of smoke or dust that was observed on that day must therefore be attributed to smoke from domestic fire and dust due to traffic or wind. A place like Bhadra is of special interest. One finds a maximum pollution here as the traffic is the heaviest at this place. The Kalupur centre is also in a busy traffic locality and thus stands second highest. The difference in the Bhadra and the Kalupur results may be partly due to the smoke from Diwali crackers, which were more prominent in the Bhadra locality. Gomatipur and Naroda Road though thickly surrounded by mills show less pollution on account

*These centres are outside the city limits and mill area.

of less traffic. The place near Gujarat College also indicates a fairly high pollution. This must be due to the smoke from the city that diffused in that direction by a low wind which appeared to blow at about 5 miles per hour. The Shahibag area shows the least pollution, being situated outside the city limits and in a direction towards which the wind was not blowing from the city.

I. It is evident from the above results that on an average the pollution of Ahmedabad air by smoke and traffic dust is of about 3,000 particles per cubic centimetre.

The investigations of Bombay air in 1934 indicated that about 1,200 particles per cubic centimetre may be due to particles other than of mill smoke. The average Sunday evening result indicates a pollution of about 2,500 particles per cubic centimetre. Thus the pollution in Bombay due to dust and domestic fire can be taken to be about 2,000 particles per cubic centimetre.

II. The air in Ahmedabad, therefore, contains about 1,000 particles more per cubic centimetre of domestic smoke and traffic dust than in Bombay.

The results of the third column, which were taken in the morning on the 7th, indicate an average pollution in the city of about 8,440 particles per cubic centimetre. The average smoke pollution outside the city limits is of about 3,500 particles per cubic centimetre. If we subtract 3,000 particles other than of mill smoke, we get a pollution of about 5,440 particles per cubic centimetre of smoke particles from mills in the morning. The average morning nuisance in Bombay is about 2,440 particles per cubic centimetre of which about 1,200 particles are other than of mill smoke. Hence in Bombay the number of smoke particles from mills is about 1,200 per cubic centimetre.

III. One concludes from the above that in Ahmedabad there are about 8,440 particles per cubic centimetre in the air in the morning, of which about 5,440 particles are due to mill smoke alone.

IV. The pollution of Ahmedabad air by mill smoke in the morning is about 4·5 (= 5,440/1,200) times more than in Bombay.

One finds a considerable increase in the evening pollution of air. The smoke emitted by the mill chimneys during the course of the whole day slowly descends downwards and is responsible for the increase of the pollution. The average pollution in the city proper is of about 14,400 particles per cubic centimetre. The average pollution outside the city areas is about 7,500 particles per cubic centimetre. Assuming again that about 3,000 particles are due to other causes than the mills we find about 11,400 particles of smoke from mills in the evening. In Bombay the average number of particles in the evening is about 3,600 per cubic centimetre of which about 1,200 are of other than mill smoke; hence 2,400 particles per cubic centimetre are from mills alone.

V. It is therefore evident that there are over 14,000 particles per cubic centimetre in the ahmedabad air in the evening of which about 11,000 particles are of mill smoke only.

VI. The evening pollution of the Ahmedabad air by mill smoke alone is 4·7 (= 11,400/2,400) times that in Bombay. It is seen from IV and VI that the ratio of the contents of the mill smoke in Ahmedabad to Bombay is about 4·6.

My thanks are due to the authorities of the Royal Institute of Science for allowing me to take a large number of apparatus to Ahmedabad, and giving me the necessary permission to carry out this investigation.

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Twenty-sixth Annual Report of the Bombay Smoke-nuisances Commission

For the Year 1938-39

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1939

TWENTY-SIXTH ANNUAL REPORT OF THE BOMBAY SMOKE NUISANCES COMMISSION FOR THE YEAR 1938-39.

This report covers the period from 1st April 1938 to 31st March 1939. The Commission consisted of the following members :—

President.

(1)	Mr. J. F. Gennings, C.I.E., C.B.E., Bar-at-Law, Commissioner of Labour.	*Ex-officio.*

Members.

(2)	Mr. P. B. Advani, from 1st April 1938 to 17th June 1938. Rao Bahadur B. P. Jagtap, from 18th June 1938 to 31st March 1939.	Nominated by Government.
(3)	Mr. R. B. McGregor	
(4)	Mr. E. G. Cameron	
(5)	Mr. W. F. Webb	Elected by the Bombay Millowners' Association.
(6)	Mr. Mark Binnie	
(7)	Mr. H. F. Milne	Elected by the Chamber of Commerce, Bombay.

SUB-COMMITTEE FOR AHMEDABAD.

Chairman.

(1)	Mr. G. G. Drewe, I.C.S., Collector of Ahmedabad.	*Ex-officio.*

Members.

(2)	Mr. B. S. Vyas, I.S.E., Executive Engineer, Ahmedabad Division.	*Ex-officio.*
(3)	Dr. Hariprasad Vrajrai Desai ...	Elected by the Ahmedabad Municipality.
(4)	Seth Nanddas Haridas ...	Elected by the Millowners' Association, Ahmedabad.

During the year two meetings of the Commission were held in Bombay and the Sub-Committee met once in Ahmedabad.

In Bombay, the time of one Inspector was mainly devoted to smoke nuisances inspection throughout the year, while in Ahmedabad the work was done by the Resident Inspector, in addition to his boiler inspection duties.

The following table summarises and compares the work of the year and that of the preceding year in the two areas :—

		Observations of chimneys.	Visits to factories.	Test of appliances.
Bombay	1937-38 ...	3,004	757	121
	1938-39 ...	2,987	753	43
Ahmedabad	1937-38 ...	1,826	790	26
	1938-39 ...	1,793	663	23
Total ...	1937-38 ...	4,830	1,547	147
	1938-39 ...	4,780	1,416	66

The changing of the mills and factories from coal to oil fuel still continues in Bombay. The number of inspections is nearly the same as last year and the number of tests of appliances has decreased as compared with the figures of the last year. The instructions issued by the Inspector are properly carried out, and it was not therefore necessary to pay visits for the same purpose. The number of complaints forwarded by the Municipality and by the public direct to this office, shows a slight increase.

In Ahmedabad the number of observations, visits to factories and tests of appliances showed a decrease over last year's figures, as the Smoke Inspector had to attend to the District boiler inspection work for more than a month.

The emission of smoke is recorded according to the following table :—

Scale No. 1	...	...	... No smoke.
,, No. 2	...	...	... Light grey.
,, No. 3	...	...	... Grey.
,, No. 4	...	...	... Very dark grey.
,, No. 5	...	...	... Black.
,, No. 6	...	...	... Dense black.

For the purpose of smoke nuisance inspection, only scales Nos. 4, 5 and 6 are important. In Bombay and other areas to which the

Act has been applied, the emission of dense black smoke (scale No. 6) is prohibited. Scales Nos. 5 and 4 are related to scale No. 6 as follows:—

One minute of scale No. 5 (black smoke) is taken as equal to ·55 minute of scale No. 6 (dense black smoke) and one minute of scale No. 4 (very dark grey) is taken as equal to ·37 minute of scale No. 6.

On this basis the average emission of smoke was equal to ·524 minutes per hour of dense black smoke for each of 2,566 observations of the chimneys per hour in Bombay, as compared with ·493 per hour in the preceding year.

For each of the 1,426 observations of the chimneys for one hour at Ahmedabad the average emission was equal to 1·1 minutes per hour as compared with 1·01 per hour for the preceding year.

There were at the close of the year 1,161 stationary chimneys in Bombay Island and Coorla, and 155 in Ahmedabad on the Register of the Commission. The above figures represent the number of existing chimneys only, those removed being struck off the Register. During the year 69 chimneys were added to the Register in Bombay and five at Ahmedabad. In addition to the registered stationary chimneys, there are many portable chimneys controlled by the Commission such as those connected to Railway locomotives, road rollers, portable engines, steam ships and launches, etc.

Observations are taken daily of the smoke emitted from the various chimneys, to see that they do not exceed the limits prescribed under the Rules. For the purpose of comparison and record, a series of observations of one hour duration are taken from which is compiled the average emission for each month, and subsequently an average for the year. This total is taken as representative of the average smoke emissions for the area throughout the year. The following table shows the yearly average emissions of smoke for Bombay and Ahmedabad since statistics have been maintained:—

Year.	Scales Nos. 6, 5 and 4 reduced to scale No. 6, i.e. dense black, minutes per hour.
BOMBAY.	
1913 February...	11·6
1913 March	6·5
1914 „	1·86
1915 „	1·474
1916 „	1·432
1917 „	1·235
1918 „	1·203
1919 „	1·144
1920 „	1·254

Year.		Scales Nos. 6, 5 and 4 reduced to scale No. 6, i.e. dense black, minutes per hour.
	BOMBAY—*contd.*	
1921	March	1·406
1922	,, ...	1·82
1923	,, ...	1·55
1924	,, ...	1·949
1925	,, ...	1·416
1926	,, ...	1·146
1927	,, ...	1·26
1928	,, ...	1·104
1929	,, ...	·61
1930	,, ...	·51
1931	,, ...	·477
1932	,, ...	·623
1933	,, ...	·430
1934	,, ...	·392
1935	,, ...	·377
1936	,, ...	·411
1937	,, ...	·499
1938	,, ...	·493
1939	,, ...	·524
	AHMEDABAD.	
1924	(November 1923 to March 1924)	6·56
1925	March	3·95
1926	,, ...	3·5
1927	,, ...	2·68
1928	,, ...	2·63
1929	,, ...	2·00
1930	,, ...	2·23
1931	,, ...	1·4
1932	,, ...	1·59
1933	,, ...	1·73
1934	,, ...	1·52
1935	,, ...	·97
1936	,, ...	·99
1937	,, ...	·99
1938	,, ...	1·01
1939	,, ...	1·1

The following notices and warnings were issued during the year :—

		Notices.	Intimations.	Statutory warnings.
Bombay	Factories	420	5	7
	Locomotives	6	*Nil.*	*Nil.*
	Steam lorries, road rollers, cranes and single boilers ...	9	*Nil.*	1
	Steam ships	6	*Nil.*	*Nil.*
	Tugs and launches	1	*Nil.*	*Nil.*
Ahmedabad	Factories	201	9	15
	Locomotives	*Nil.*	*Nil.*	*Nil.*
	Road rollers, cranes and single boilers	*Nil.*	*Nil.*	*Nil.*

Forty complaints were received from the public in Bombay during the year, and all possible steps were taken to minimise the nuisances complained of. Most of the complaints were mainly against small concerns such as bakeries, eating houses, metal casting bhuttics, etc., and some were against silk factories.

During the year three complaints were received from the public at Ahmedabad. Two of the complaints were suitably dealt with, but the third resulted in prosecution.

The Agents and the Manager of the Dhanraj Mills Ltd., Lower Parel, Bombay, were prosecuted for breach of Rule 23 (3). The Court was convinced of the offences committed, but as the accused had carried out the requirements to the satisfaction of this Department and the emission of smoke had been eliminated, the Court took a lenient view of the case and acquitted the accused.

There were three prosecutions in Ahmedabad during the year— two for the infringement of Rule 23 (3) and one for breach of sections 9-A (*1*) and 9-A (*2*) of the Act. In all the cases the accused were found guilty, convicted and fined Rs. 125 and Rs. 70 respectively.

During the year the Commission examined at Bombay 29 plans of proposed flues and chimneys, and six at Ahmedabad. The plans in Bombay related to new concerns while the plans dealt with at Ahmedabad related to additions and alterations to the existing plants.

The question of erecting an observation tower with a telephone connection at Ahmedabad as referred to in the last year's report is still under consideration of the Ahmedabad Municipality.

The thanks of the Commission are due to the mill and factory owners, heads of engineering departments, public bodies, shipping agencies, etc., for their cordial co-operation with the Inspectors in securing the abatement of smoke nuisance and by dealing departmentally with

negligent drivers and firemen responsible for causing unnecessary smoke. Such co-operation is necessary if the best results are to be obtained and although domestic smoke is outside the scope of the Commission, the general public can also assist by using coke or other smokeless fuel or by adopting gas or electricity for cooking purposes.

As usual the officers of the Bombay Municipality and particularly those of the Health and Licensing Departments gave their full co-operation by forwarding complaints, supplying information regarding new and defective installations and advising complainants to get in touch with the Smoke Nuisances Department.

The Commission is satisfied with the work carried out by the inspecting staff during the year.

J. F. GENNINGS,
Commissioner of Labour and President,
Bombay Smoke Nuisances Commission.

Bombay, 8th May 1939.

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